VERITAS NetBackup™ 4.5 for DB2

System Administrator's Guide

UNIX

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Preface

This guide describes how to install, configure, and use VERITAS NetBackup for DB2 agent on a UNIX platform.

For specific information about the NetBackup server software, refer to:

- *NetBackup System Administrator's Guide for UNIX*, if you have a UNIX server.

  or

- *NetBackup System Administrator's Guide for Windows* if you have a Windows NT/2000 server.

This document is the same as `NetBackup_AdminGuide_DB2_UNIX.pdf` distributed with the NetBackup for DB2 on UNIX software.

Audience

This guide is intended for the:

- DB2 database system administrator responsible for configuring and using the databases.
- NetBackup system administrator responsible for configuring NetBackup.

  A system administrator is defined as a person with system administrator privileges and responsibilities.

This guide assumes:

- A basic understanding of system administration.
- A working understanding of the NetBackup client and server software.
- A familiarity with the information covered in the following NetBackup manuals:
  - *NetBackup User's Guide - UNIX*
  - *NetBackup System Administrator's Guide for UNIX* or *NetBackup System Administrator's Guide for Windows*
  - *NetBackup Troubleshooting Guide - UNIX or NetBackup Troubleshooting Guide - Windows NT Server.*
- A thorough understanding of the following DB2 database topics:
  - DB2 Administration
  - DB2 Commands
  - User Exit Program

Accessibility

NetBackup contains features that make the user interface easier to use by people who are visually impaired and by people who have limited dexterity. Accessibility features include:

- Support for assistive technologies such as screen readers and voice input (Windows servers only)
- Support for keyboard (mouseless) navigation using accelerator keys and mnemonic keys

For more information, see the NetBackup system administrator's guide.

Organization

This guide is organized as follows:

- The Introduction provides an overview of terminology for NetBackup for DB2 on UNIX.
- The Installation chapter explains how to install NetBackup for DB2 on UNIX on your system.
- The Configuration chapter explains how to configure your system to use NetBackup for DB2 on UNIX. This information supplements the NetBackup System Administrator Guides.
- Using NetBackup for DB2 on UNIX explains how to use this product to backup and restore your databases. This information supplements the NetBackup manuals.
- Using NetBackup for DB2 with SAP provides guidelines for using SAP, DB2, and NetBackup together.
- Troubleshooting provides troubleshooting information.
- The Configuration for an DB2 EEE Environment appendix contains special instructions for DB2 databases in a DB2 Enterprise - Extended Edition (EEE) environment.

Related Documents

The following documents provide related information. For a more detailed listing of NetBackup documents, refer to *NetBackup Release Notes*.

If you have a UNIX server, refer to these documents:

- *NetBackup System Administrator's Guide for UNIX*

  Explains how to configure and manage NetBackup on a UNIX system.

- *NetBackup Media Manager System Administrator's Guide for UNIX*

  Explains how to configure and manage the storage devices and media on UNIX NetBackup servers. Media Manager is part of NetBackup.

- *NetBackup Troubleshooting Guide - UNIX*

  Provides troubleshooting information for UNIX-based NetBackup products. You can also refer to `www.support.veritas.com`, access the Knowledge Base Search option, and search for TechNotes.

If you have a Windows server, refer to these documents:

- *NetBackup System Administrator's Guide for Windows*

  Explains how to configure and manage NetBackup on a Windows server system.

- *NetBackup Media Manager System Administrator's Guide for Windows*

  Explains how to configure and manage the storage devices and media on Windows NetBackup servers. Media Manager is part of NetBackup.

- *NetBackup Troubleshooting Guide for Windows*

  Provides troubleshooting information for Windows-based NetBackup products. You can also refer to `www.support.veritas.com`, access the Knowledge Base Search option, and search for TechNotes.

For IBM DB2, you may also need the following manuals from IBM:

- *IBM DB2 Universal Database for UNIX Quick Beginning*
- *IBM DB2 Universal Database for UNIX Command Reference*
- *IBM DB2 Universal Database Data Recovery and High Availability Guide and Reference*

Conventions

The following explains typographical and other conventions used in this guide.

Type Style

Typographic Conventions

Typeface	Usage
`Bold fixed width`	Input. For example, type **`cd`** to change directories.
`Fixed width`	Paths, commands, filenames, or output. For example: The default installation directory is `/opt/VRTSxx`.
Italics	Book titles, new terms, or used for emphasis. For example: *Do not* ignore cautions.
Sans serif (italics)	Placeholder text or variables. For example: Replace *filename* with the name of your file.
Serif (no italics)	Graphical user interface (GUI) objects, such as fields, menu choices, etc. For example: Enter your password in the **Password** field.

Notes and Cautions

Note This is a Note. Notes are used to call attention to information that makes using the product easier or helps in avoiding problems.

Caution This is a Caution. Cautions are used to warn about situations that could cause data loss.

Key Combinations

Some keyboard command sequences use two or more keys at the same time. For example, holding down the **Ctrl** key while pressing another key. Keyboard command sequences are indicated by connecting the keys with a plus sign. For example:

Press Ctrl+t

Command Usage

The following conventions are frequently used in the synopsis of command usage.

brackets [ ]

The enclosed command line component is optional.

Vertical bar or pipe (|)

Separates optional arguments from which the user can choose. For example, when a command has the following format:

`command` *arg1*|*arg2*

the user can use either the *arg1* or *arg2* variable.

Terms

The terms listed in the table below are used in the VERITAS NetBackup documentation to increase readability while maintaining technical accuracy.

Term	Definition
Microsoft Windows, Windows	Terms used as nouns to describe a line of operating systems developed by Microsoft, Inc. A term used as an adjective to describe a specific product or noun. Some examples are: Windows 95, Windows 98, Windows NT, Windows 2000, Windows servers, Windows clients, Windows platforms, Windows hosts, and Windows GUI. Where a specific Windows product is identified, then only that particular product is valid with regards to the instance in which it is being used. For more information on the Windows operating systems that NetBackup supports, refer to the VERITAS support web site at `http://www.support.veritas.com`.
Windows servers	A term that defines the Windows server platforms that NetBackup supports; those platforms are: Windows NT and Windows 2000.
Windows clients	A term that defines the Windows client platforms that NetBackup supports; those platforms are: Windows 95, 98, ME, NT, 2000, XP (for 32- and 64-bit versions), and LE.

Getting Help

For updated information about this product, including system requirements, supported platforms, supported peripherals, and a list of current patches available from Technical Support, visit our web site:

```
http://www.support.veritas.com/
```

VERITAS Customer Support has an extensive technical support structure that enables you to contact technical support teams that are trained to answer questions to specific products. You can contact Customer Support by sending an e-mail to support@veritas.com, or by finding a product-specific phone number from the VERITAS support web site. The following steps describe how to locate the proper phone number.

1. Open `http://www.support.veritas.com/` in your web browser.
2. Click **Contact Support**. The *Contacting Support Product List* page appears.
3. Select a product line and then a product from the lists that appear. The page will refresh with a list of technical support phone numbers that are specific to the product you just selected.

Introduction 1

NetBackup for DB2 on UNIX integrates the database backup and recovery capabilities of DB2 commands with the backup and recovery management capabilities of NetBackup.

This chapter introduces NetBackup for DB2 on UNIX and how it relates to both DB2 commands and NetBackup. Read this chapter for a description of:

- Terminology for NetBackup for DB2 on UNIX
- Features of NetBackup for DB2 on UNIX
- Technical Overview of NetBackup for DB2 on UNIX

Terminology for NetBackup for DB2 on UNIX

NetBackup Terms

This section describes NetBackup terms as they apply to NetBackup for DB2 on UNIX.

NetBackup	NetBackup backs up and restores files, directories, raw partitions, and databases on client systems that have DB2 databases.
NetBackup policy	NetBackup policies define criteria for backups and restores. These criteria include storage unit and media to use, backup schedules, clients, files to back up, or backup templates or scripts to execute.
NetBackup schedule	NetBackup schedules control NetBackup operations such as: when backups can occur, the type of backup (full, incremental) to perform, and how long NetBackup retains the image (retention level).
Administrator directed backups	NetBackup administrators are able to perform remote backups of all files, directories, databases, and raw partitions contained on client systems within a client/server network via NetBackup interfaces.
User-directed backups and restores	NetBackup users are able to perform backups of all files, directories, databases, and raw partitions contained on client systems within a client system. In the case of DB2, user-directed operations are performed on the DB2 client via DB2 interfaces.
Graphical interfaces	Graphical user interfaces are available for both users and administrators.
Media Manager	The Media Manager provides complete management and tracking of all devices and media used during backups and restores.

DB2 Database Terms

This section describes DB2 database terms as they apply to NetBackup for DB2 on UNIX.

`BACKUP DATABASE` Command	`BACKUP DATABASE` is a DB2 UDB command which initiates the backup of a database. For details, refer to *IBM DB2 Universal Database Command Reference.*

RESTORE DATABASE Command	RESTORE DATABASE is a DB2 UDB command which initiates the restore of a DB2 database. For details, refer to *IBM DB2 Universal Database Command Reference.*
ROLLFORWARD DATABASE Command	ROLLFORWARD DATABASE is a DB2 UDB command which initiates the rollforward recovery of transactions recorded in database logs. For details, refer to *IBM DB2 Universal Database Command Reference.*
DB2 script	A DB2 script contains BACKUP DATABASE or RESTORE DATABASE commands.
User Exit Program	A program that manages the backup and recovery of the DB2 archived logs, used during rollforward recovery. The program is called db2uext2.
Vendor I/O Library	The Vendor I/O Library contains I/O functions provided by NetBackup for DB2 on UNIX in a shared library. The Vendor I/O Library is used by the BACKUP DATABASE and RESTORE DATABASE commands to send data buffers between a DB2 database and NetBackup.
UDB	Universal Database.
EEE	The IBM DB2 Enterprise - Extended Edition environment. This refers to a database that is distributed across multiple hosts, or nodes. In a non-EEE environment, the database is typically centralized on a single host.

Features of NetBackup for DB2 on UNIX

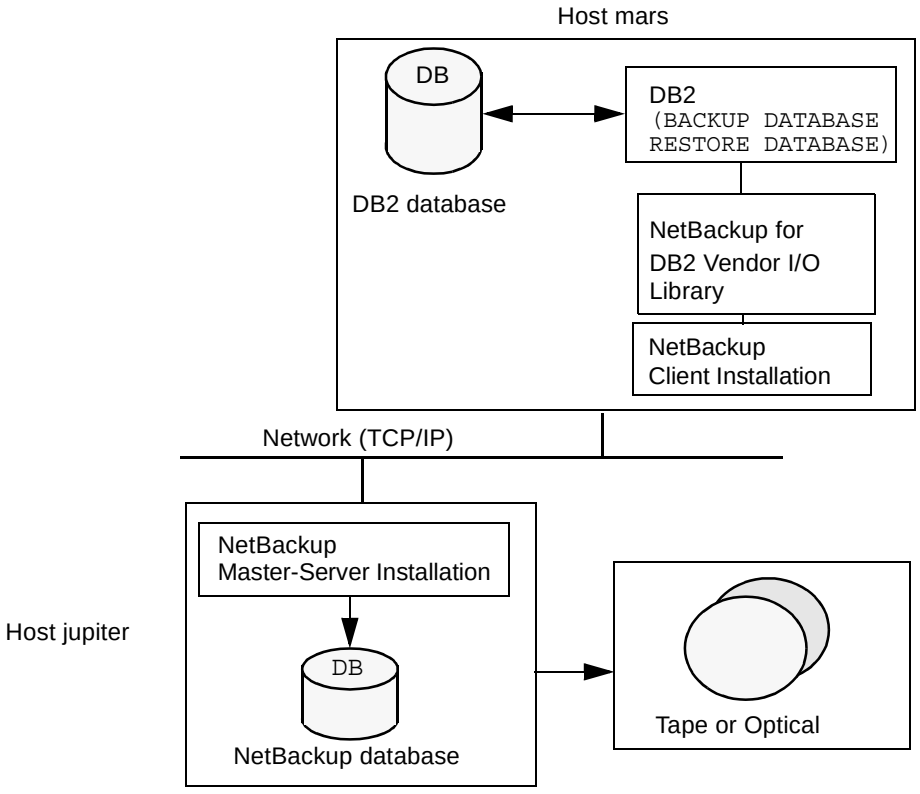
This section describes the NetBackup for DB2 on UNIX main features.

Feature	Description
Media and device management	All devices supported by Media Manager are available to NetBackup for DB2 on UNIX.
Scheduling facilities	NetBackup scheduling facilities on the master server can be used to schedule automatic and unattended DB2 backups. This also lets you choose the times when these operations can occur. For example, to prevent interference with normal daytime operations, you can schedule your database backups to occur only at night.
Multiplexed backups and restores	NetBackup for DB2 on UNIX lets you take advantage of NetBackup's multiplexing capabilities. Multiplexing directs multiple data streams to one backup device, thereby reducing the time necessary to complete the operation.
Transparent execution of both DB2 and regular file system backup and restore operations	All backups and restores are executed simultaneously and transparently without any action from the NetBackup administrator. A DB2 administrator can execute database backup and restore operations through NetBackup or use DB2 commands as if NetBackup were not present. An administrator or any other authorized user can use NetBackup to execute database backups and restores.
Sharing the same devices and tapes used during other file backups	It is possible to share the same devices and media used for other backups or to give DB2 exclusive use of certain devices and media.
Centralized and networked backup operations	From the NetBackup master server, you can schedule database backups or start them manually for any client. The DB2 databases can also reside on hosts that are different from the devices on which NetBackup stores the backups.

Feature	Description
Graphical user interfaces	NetBackup provides the following graphical user interfaces for client users and administrators: ◆ Backup, Archive, and Restore user interface ◆ NetBackup Administration Console for Java ◆ NetBackup Administration Console for Windows A database administrator or NetBackup administrator can start backup or restore operations for DB2 from the NetBackup graphical user interface on the master server. A database administrator can also use the IBM DB2 Control Center or Command Line Processor to start user-directed backup and restore operations.
Parallel backup and restore operations	NetBackup for DB2 on UNIX supports the parallel backup and restore capabilities of the DB2 commands. This permits the user to run more than one tape device at a time for a single DB2 backup or restore, thereby reducing the time necessary to complete the operation.

Technical Overview of NetBackup for DB2 on UNIX

The example network in the following illustration shows the major components in a NetBackup for DB2 on UNIX configuration.



The storage devices are connected to the NetBackup master server or a remote media server. Both the master server and the remote media server must have NetBackup server software installed.

The host with the DB2 database must be a NetBackup client and have NetBackup for DB2 on UNIX installed.

NetBackup for DB2 Components

Following are the main components in the NetBackup for DB2 system.

NBDB2 Vendor I/O Library

The NetBackup vendor library is used by DB2 commands when executing backups and restores. The location of the vendor library is

On Solaris - *install_path*/NetBackup/bin/nbdb2.so

On Solaris 64 bit- *install_path*/NetBackup/bin/nbdb2.so64

On AIX - *install_path*/NetBackup/nbdb2.sl

On AIX 64 bit - *install_path*/NetBackup/bin/nbdb2.sl64

(for example, /usr/openv/netbackup/bin/nbdb2.sl).

The library is called by the DB2 BACKUP and RESTORE commands, with the LOAD parameter. For example,

```
BACKUP DB SAMPLE … LOAD /usr/openv/netbackup/bin/nbdb2.sl
```

DB2 User-Exit Program

A user-exit program is used by DB2 to backup and restore database log files. The location of the DB2 user-exit program is <*DB2_INSTANCE*>/adm/db2uext2. The user-exit program is invoked by the DB2 BACKUP and ROLLFORWARD commands. For example,

```
ROLLFORWARD DB SAMPLE … TO END OF LOGS …
```

Sample Configuration File

A NetBackup for DB2 configuration file is used to store backup and restore preferences. The vendor library and user-exit program use these settings. The location of the file is <*DB2_INSTANCE*>/db2.conf (for example, /home/db2inst1/db2.conf). This file contains various NetBackup settings, like the policy and schedule.

Sample Script Files

NetBackup invokes a script to perform a scheduled backup or restore of a DB2 database. The user must customize the provided sample script file(s) for their environment. The sample scripts contain DB2 BACKUP or RESTORE commands for use with NetBackup.

NetBackup for DB2 Backup Overview

Database Backup

The DB2 user invokes a database backup by using the DB2 Control Center or Command Line Processor. When initiating the backup command, you must specify the location of the NBDB2 library.

A scheduled task within NetBackup can also be used to backup a database. At the scheduled time, the NetBackup task will execute a script containing the necessary DB2 commands to perform a backup. The script is written by the user to perform the desired operations.

Regardless of the interface used to initiate the backup, DB2 conducts the backup by issuing `start`, `write`, and `end` instructions to the NBDB2 library.

`start`	The `start` instruction causes NBDB2 to verify the backup settings with the master server, such as policy, schedule, and client permissions. Next, start causes NBDB2 to reserve resources like drives and media on the media server.
`write`	The `write` instruction is then repeatedly issued by DB2, each time passing a portion of the backup image. NBDB2 takes the data and directs it to the media server for storage.
`end`	Finally, the `end` instruction is issued when DB2 has successfully written the entire backup image. NBDB2 informs the media server to commit any buffered data, and informs the master server to catalog the operation.

Log File Archiving

DB2 uses log files to preserve database transactions that have not been persistently recorded in the database. Once all transactions in a log file are persistently recorded, that log file can be archived. The DB2 USEREXIT setting enables the use of log files.

DB2 invokes the user-exit program to archive a log file at these times:

- The "user exits" the database using the DB2 TERMINATE command.
- The log file is full and transactions are being recorded into another log file.

In DB2 version 7 and later, these events also invoke the user-exit program:

- The DB2 BACKUP command is issued.

- The DB2 ARCHIVE LOG command is issued.

NetBackup provides a user-exit program for use with DB2. It supports two modes of operation:

- Saving archived log files directly to NetBackup.
- Copying archived log files to another directory, for later backup by NetBackup.

Saving the log files directly to NetBackup is simply the automatic backup of the log file. DB2 invokes the NetBackup user-exit program, which initiates a file backup operation.

Copying the log files to a directory is used in conjunction with a scheduled backup. In this case, the NetBackup user-exit program copies the file to an archive directory. Later (for example, nightly), a scheduled NetBackup task runs to backup all files in the archive directory. After backup, the task can optionally delete these files to free disk space.

The save and copy methods require different restore procedures, as explained below.

NetBackup for DB2 Restore Overview

Database Restore

The DB2 user invokes a database restore by using the DB2 Control Center or Command Line Processor. When initiating the restore command, the vendor library option must specify the location of the NBDB2 library.

A scheduled task within NetBackup can also be used to restore a database. At the scheduled time, the NetBackup task will execute a script containing the necessary DB2 commands to perform a restore. The script is written by the user to perform the desired operations.

Regardless of the interface used to initiate the restore, DB2 conducts the restore by issuing `start`, `read`, and `end` instructions to the NBDB2 library.

`start`	The `start` instruction causes NBDB2 to verify the restore settings and permissions with the master server, and locates the requested image within the media server.
`read`	The `read` instruction is then repeatedly issued by DB2, each time requesting a portion of the backup image. NBDB2 reads data from the media server and returns it to DB2.
`end`	Finally, the `end` instruction is issued when DB2 has successfully restored the entire image, and NBDB2 informs the media server to release the resources.

Log File Rollforward

Once the database is successfully restored, transactions recorded in the log files need to be re-applied. The DB2 ROLLFORWARD command restores transactions made since the last backup. For example, if the backup image was created 10 days ago and restored today, the log files are used to restore transactions that occurred after the backup.

DB2 assumes the *active* log files are safely preserved on disk. By definition, the active log files have never been archived. However, the *archived* log files need to be restored for the rollforward operation. DB2 invokes the user-exit program to restore archived log files.

If the log files were saved directly to NetBackup, the user-exit program simply initiates a file restore operation. DB2 invokes the user-exit program, providing the filename to restore. The user-exit program searches the NetBackup catalog for that file. When found, it is then restored directly to the DB2 log directory.

If the log files were first copied to an archive directory and later backed up by a scheduled task, the recovery process is a bit different. First, the user must use NetBackup to restore all log files created since the database backup image, e.g. 10 days ago. The files must be restored to the archive directory, not the DB2 log directory. When the rollforward operation is performed, DB2 will instruct the user-exit program to restore a log file. The user-exit program simply searches the archive directory for the file. When found, it is then copied from the archive directory into the DB2 log directory.

Log files saved directly to tape require no user intervention during the recovery. However, their sequential recovery can be slow when dealing with numerous, large log files. Log files that are first copied and later backed up require some user intervention during the recovery. Specifically, you must restore these files prior to the rollforward. Advanced users prefer this approach because of performance and flexibility benefits.

DB2 Commands

This section describes DB2 commands that interact with NetBackup, and options important to proper operation. See the DB2 UDB Command Reference for a complete description of these commands.

Backup

The DB2 `BACKUP DATABASE` command is used to backup a database to NetBackup.

`LOAD` <*NBDB2 Library Path*>	Instructs DB2 to use the NBDB2 vendor library when performing the backup.

OPEN (number) SESSIONS	Specifies the number of concurrent data streams used for writing data. Use this option if you have multiple backup devices available, or have multiplexing enabled in NetBackup.
WITH (number) BUFFERS	Use this option when opening multiple sessions (see above). **Note** The number of buffers must be twice the number of sessions.
BUFFER size	Use this option to increase or decrease the buffer size if necessary. Increased size can benefit performance, while decreased size may be necessary if using numerous buffers. DB2 recommends the size be a multiple of the extent size. The DB2 DFT_EXTENT_SZ setting defines the default extent size.
WITHOUT PROMPTING	This option is required for unattended backups, and must be specified in backup scripts executed by NetBackup.

Restore

The DB2 RESTORE DATABASE command is used to restore a database from NetBackup.

LOAD <*NBDB2 Library Path*>	Instructs DB2 to use the NBDB2 vendor library when performing the restore.
OPEN (number) SESSIONS	Typically, you should specify the same number of sessions used during the backup. Using fewer sessions is allowed, but may degrade overall restore performance. Specifying more sessions has no benefit.
WITH (number) BUFFERS	Use this option when opening multiple sessions (see above). **Note** The number of buffers must be twice the number of sessions. Using fewer buffers can degrade performance, or cause the restore to fail when reading multiplexed images.
BUFFER size	Use this option to increase or decrease the buffer size if necessary. Increased size can benefit performance, while decreased size may be necessary if using numerous buffers. DB2 will alter the actual size to be a multiple of the size used during the backup.
WITHOUT PROMPTING	This option is required for unattended restores, and must be specified in backup scripts executed by NetBackup.
INCREMENTAL	When using this option, DB2 may not read the entire image from NetBackup media. Consequently, NetBackup will log an error in the Activity Monitor, which can safely be ignored.

`HISTORY FILE`	When using this option, DB2 may not read the entire image from NetBackup media. Consequently, NetBackup will log an error in the Activity Monitor, which can safely be ignored.

Installation 2

This chapter describes the NetBackup for DB2 on UNIX installation procedure. It includes a section on installation prerequisites.

To determine which DB2 version levels are supported, refer to the Database Agent Platform Support secction in the *NetBackup Release Notes.*

At the time of the this release, NetBackup for DB2 supports the following DB2 Universal Database Versions:

- 6.1.x FixPak 9
- 7.1.x FixPak 4
- 7.2.x FixPak 4

The Extended Edition (EE) and the Enterprise Extended Edition (EEE) are also supported at these versions.

Installation Prerequisites

Before installing NetBackup for DB2 on UNIX, be sure you have completed the following procedures:

- Install the NetBackup server software on the server.

  The NetBackup server platform can be any of those that NetBackup supports.

  For a DataCenter installation, refer to the *NetBackup DataCenter Installation Guide for UNIX* or the *NetBackup DataCenter Installation Guide for Windows.*

- Install the NetBackup client software on the client where you will be backing up the databases.

  For a DataCenter installation, refer to the *NetBackup DataCenter Installation Guide for UNIX* for installation instructions on UNIX clients.

Caution In an DB2 EEE environment, the NetBackup client software must be installed on every node / client used by DB2.

- Install the DB2 vendor software on the client where you will be backing up the databases.

  See the following for more details:

  - *IBM DB2 Universal Database Quick Beginnings*

Now you are ready to install NetBackup for DB2 on UNIX on the client where you will be backing up the databases. Refer to the next section for detailed instructions on installing NetBackup for DB2 on UNIX.

Installing NetBackup for DB2 on UNIX

There are two ways to install database agent software.

- Remote Installation - Loads the software on a master server. The user will then push the database software out to affected clients.

  Refer to the following section.

- Local Installation - Loads and installs the software only to the local machine.

  Refer to “Local Installation of NetBackup for DB2 on UNIX” on page 21.

Remote Installation of NetBackup for DB2 on UNIX

During a remote installation, NetBackup for DB2 on UNIX files are loaded onto the current machine, which must be a UNIX master server. The software will then be distributed to the clients and installed.

Installation Requirements

- The version of the NetBackup Client and the version of NetBackup for DB2 on UNIX must be the same (e.g., 4.5).
- There must be adequate disk space on each client that will receive the software.

  Less than one megabyte of additional disk space is required in the client's *install_path*`/netbackup` directory. However, more disk space may be necessary at run time.

- NetBackup version 4.5 software is installed and operational on each DB2 host.

  This also means that the directory *install_path*`/netbackup` already exists on each DB2 host.

- DB2 database instances exist on the DB2 host.

Remote Install Procedure

1. Log in as the root user on the server.

   If you are already logged in, but are not the root user, execute the following command.

   ```
   su - root
   ```

2. Make sure a valid license key for NetBackup for DB2 on UNIX has been registered. To view or add license keys, perform one of the following:

- Run the command *install_path*`/netbackup/bin/admincmd/get_license_key`.
- Open the NetBackup Administration Console and from the **Help** menu choose **License Keys**.

3. Insert the CD-ROM into the drive.

4. Change the working directory to the CD-ROM directory.

   `cd /CD_mount_point`

5. Load the software on the server by executing the `install` script.

   `./install`

   a. Select the NetBackup Database Agent Software option.

   The following prompt will appear:

   ```
   Do you want to do a local installation? (y/n) [n]
   ```

   b. Answer **`n`**.

   You are presented with a menu of all database agents available on the CD-ROM.

   c. Select the NetBackup for DB2 option.

   d. Enter **`q`** to quit selecting options.

   A prompt will appear asking if the list is correct.

   e. Answer **`y`**.

   The `install` script identifies the types of client software loaded during the installation of the NetBackup server. By default, any matching NetBackup for DB2 on UNIX software will automatically be loaded. If there are more platforms available, the script displays a menu giving you the opportunity to add more client types to the default list. Once the list is complete, database agent version files, compressed tar files and the `install_dbext` script are copied to directory *install_path*`/netbackup/dbext`.

6. Distribute and install the NetBackup for DB2 on UNIX software on each client as described in the next sections.

   There are two types of installs.

   - *initial install* — Use an initial install if the clients you intend to update have not been configured into policies of type DB2.

- *upgrade install* — Use an upgrade install if all the clients you intend to update already have been configured into policies of type DB2.

Note The NetBackup version level (for example, 4.5) running on the clients you wish to update must be the same as the version level of the NetBackup for DB2 on UNIX being installed.

Initial Install Procedure

1. Execute the following command to create a file containing a list of clients currently configured in the NetBackup database.

   `cd` *`install_path`*`/netbackup/bin`
   `./admincmd/bpplclients -allunique -noheader >` *filename*

   where *filename* is the name of the file to contain the list of unique clients. If no clients have been configured in the NetBackup database, and therefore *filename* is empty, create *filename* using the same format as that generated by `bpplclients`.

   `bpplclients` generates output in following format:

   hardware operating_system client_name

   where:

   hardware is the hardware name. For example, execute the `ls` command in directory *install_path*`/netbackup/client`.

   operating_system is the operating system name. For example, execute the `ls` command in directory *install_path*`/netbackup/client/`*hardware*.

   client_name is the name of the client.

   For example, the contents of *filename* might look like this:

   ```
   Solaris Solaris2.6 curry
   RS6000 AIX4.3.3 cypress
   ```

2. Edit *filename*.

   This is an optional step. Use it if the contents of *filename* need to be changed. Edit *filename* to contain only those clients you wish to update with NetBackup for DB2 on UNIX software.

3. Specify *filename* on the `update_dbclients` command.

   For example:

   `cd` *`install_path`*`/netbackup/bin`
   `./update_dbclients DB2 -ClientList` *filename*

Note If the receiving client is configured as a Solaris2.6, Solaris7, Solaris8, Solaris9, AIX4.3.3, or AIX5 machine, both the 32 bit and 64 bit versions of NetBackup for DB2 on UNIX will be installed.

Only clients listed in *filename* will be updated.

Upgrade Install Procedure

1. Execute the following command.

   ```
   cd install_path/netbackup/bin
   ./update_dbclients DB2 ALL ALL
   ```

   This command will look at all possible clients and only update the ones currently in the DB2 policy type.

   Instead of `ALL ALL`, you may use `-ClientList` *filename* as explained in "Initial Install Procedure" on page 17.

Note If the receiving client is configured as a Solaris2.6, Solaris7, Solaris8, Solaris9, AIX4.3.3, or AIX5 machine, both the 32 bit and 64 bit versions of NetBackup for DB2 on UNIX will be installed.

Note With an initial or upgrade install, some clients may be skipped and not updated. Possible reasons are:
- the client is a PC client (which cannot be updated from a UNIX server)
- NetBackup for DB2 on UNIX does not support that client's platform type
- the NetBackup for DB2 on UNIX software for that client type was not loaded onto the server in step 5 of the "Remote Install Procedure" on page 15
- (if using the `ALL ALL` method) the client does not belong to the DB2 policy type

All skipped clients are available in a file whose name is displayed by `update_dbclients`.

The number of updates required to distribute the software to the clients is displayed.

If more than one update will occur, you will see the following prompt:

`Enter the number of simultaneous updates you wish to take place. 1 -` *max dflt*

(must be in the range of 1 to *max*; default: *dflt*).

where:

max is the maximum number of simultaneous updates that is allowed. The value displayed will be a number ranging from 1 to 30.

dflt is the default number the program will use if you press **Enter**. The value displayed will be a number ranging from 1 to 15.

For example, if three client updates will be performed, the *max* and *dflt* values shown would be 3. If 50 client updates will be performed, the *max* value shown would be 30 and the *dflt* value shown would be 15.

`update_dbclients` will start the number of updates that you specify. If this number is less than the total number of client updates to be performed, new updates will start as the previous updates finish until all of the updates have been completed.

Based on your answer, the time it will take to update the clients is displayed, followed by this question:

```
Do you want to upgrade the clients now? (y/n) [y]
```

2. Enter **`y`** or **`n`** for the prompt.

   If you answer **`n`**, `update_dbclients` will quit and leave the list of clients it would have updated in a file. This file can later be used by the `-ClientList` parameter mentioned previously.

   Answer **`y`** to continue the installation process.

   - If the configuration information for a client is unknown, you will be prompted for it. For example:

     ```
     -----> Client curry

       Please specify the DB2 instance home path name:
     ```

     Type the location where the DB2 vendor software has been installed on the client shown. It will continue to ask this question until you indicate you are through specifying DB2 instances. You also will have an opportunity to validate your answer.

   - If the `update_dbclients` command is able to determine a client's configuration, it will not prompt.

   To change a client's DB2 instance configuration information later, you must log onto the client and execute the command *install_path*`/netbackup/bin/install_db2`.

   - If more than one client is being updated, the configuration information for the previous client (whether determined by asking explicitly or by `update_dbclients` itself) establishes a default answer for the next client. This makes configuration simpler when the clients have been similarly configured. Therefore, you may see a display similar to the following:

     ```
     -----> Client guava

     Please specify the DB2 instance home path name:
     ```

```
The previous response to this question was:
/db2

Use the previous response? (y/n) [y]
```

Example: Let's assume that you want to update the following three clients.

`curry`

`guava`

`hat`

As far as the script is concerned, the configuration information for all three clients is unknown.

Assume the instance home path on `curry` is **`/db2inst1`**, so when you are prompted for configuration information for `curry`, specify **`/db2inst1`** as the DB2 instance home path name.

The next client is `guava`.

- If client `guava` also has **`/db2inst1`** as its DB2 instance home path name, the answer to the `Use the previous response?` prompt will be **`y`**.
- If client `guava` has a different configuration, the answer to the `Use the previous response?` prompt will be **`n`**. The `Please specify the DB2 instance home path name:` prompt will re-display. At this point you specify a different home path name**.**

  The next client is `hat`. The DB2 instance home path name you entered for `guava` becomes the "previous response" displayed for `hat` .

If the `update_dbclients` command was successful in distributing the software to the client, it will automatically run the `install_dbext` script on the client. Configuration information determined in step 2 on page 19 is used to complete the installation. If `install_dbext` has successfully completed, there will be a version file in directory *`install_path`*`/netbackup/ext` that contains the version of NetBackup for DB2 on UNIX that was installed and an installation timestamp. The `update_dbclients` command displays a note on whether the update was successful for each client. When the `update_dbclients` command has completed, it displays a file name that contains a complete log of what happened for each client. If the update failed for any client, the log file should be examined to determine the problem.

Local Installation of NetBackup for DB2 on UNIX

During a local installation, the NetBackup for DB2 on UNIX files are extracted and installed. You also are prompted for configuration information. The local machine can be a client or a master server that also happens to be a client.

Installation Requirements

- The version of the NetBackup Client and the version of NetBackup for DB2 on UNIX are the same (e.g., 4.5).
- The local machine must have adequate disk space.

  Less than one megabyte of additional disk space is required in the *install_path*`/netbackup` directory. However, more disk space may be necessary at run time.
- NetBackup version 4.5 client software is installed and operational.

  This also means that the *install_path*`/netbackup` directory already exists.
- DB2 database instances exist on the DB2 host.

Local Install Procedure

1. Log in as the root user on the machine.

   If you are already logged in, but are not the root user, execute the following command.

   ```
   su - root
   ```

   - If the local machine is a client, go to step 3.
   - If the local machine is a server, go to step 2.

2. Make sure a valid license key for NetBackup for DB2 on UNIX has been registered. To view or add license keys, perform one of the following:

   - Run the command *install_path*`/netbackup/bin/admincmd/get_license_key`.
   - Open the NetBackup Administration Console and from the **Help** menu choose **License Keys**.

3. Insert the CD-ROM into the drive.

4. Change the working directory to the CD-ROM directory.

   ```
   cd /CD_mount_point
   ```

5. Load and install the software by executing the `install` script.

Note It is expected that the NetBackup version level (for example, 4.5) running on the local machine matches the version level of the database agent being installed.

```
./install
```

a. Select the NetBackup Database Agent Software option.

The following prompt will appear:

```
Do you want to do a local installation? (y/n) [n]
```

b. Answer **`y`**.

You are presented with a menu of all database agents available on the CD-ROM.

c. Select the NetBackup for DB2 option.

d. Enter **`q`** to quit selecting options.

A prompt will appear asking if the list is correct.

e. Answer **`y`**.

The following actions will occur:

- The version file, compressed tar file and `install_dbext` script will be loaded to directory *install_path*`/netbackup/ext/dbext`.
- The `install` script will automatically execute the `install_dbext` script.
- After the `install_dbext` script unbundles the NetBackup for DB2 compressed tar file, you will be prompted for the following configuration information:

  ```
  Please specify the DB2 instance home path name:
  ```

  Type the location where the DB2 vendor software has been installed. It will continue to ask this question until you indicate you are through specifying DB2 instances.
- If the receiving client is a Solaris2.6, Solaris7, or Solaris8, AIX4.3.3, or AIX5 machine, both the 32 bit and 64 bit versions of NetBackup for DB2 on UNIX will be installed.
- If `install_dbext` has successfully completed, there will be a version file in directory *install_path*`/netbackup/ext/` that contains the version of NetBackup for DB2 on UNIX that was installed and an installation timestamp.

Upgrading from NetBackup for DB2 Version 3.4

After upgrading to this release, your existing configuration file and script files need manual updating. Perform the following steps:

1. Update the db2.conf file.

   All occurrences of the CLASS keyword should be changed to POLICY. CLASS is still recognized in this release, but will be obsoleted in a future release.

   The NORETRY setting, formerly used in some instances to support the DB2 ROLLFORWARD TO END OF LOGS operation, is no longer needed for ROLLFORWARD and should be removed.

2. Update your backup and restore scripts.

   The backup and restore scripts specify a pathname to the NetBackup for DB2 library. The pathname will require modification.

   On UNIX systems, new 64-bit libraries are available and must be used with 64-bit DB2 databases. All of the libraries reside in the NetBackup BIN directory, e.g., /usr/openv/netbackup/bin.

   For Solaris, the libraries are named

   - For 32-bit - nbdb2.so
   - For 64-bit - nbdb2.so64

   For AIX, the libraries are named

   - For 32-bit - nbdb2.sl
   - For 64-bit - nbdb2.sl64

Adding New DB2 Instances

If you add a new DB2 instance after NetBackup for DB2 on UNIX has been installed, re-install the NetBackup for DB2 agent. This ensures that all new database instances will be included in the NetBackup for DB2 backup operations.

Note Re-installing performs the necessary step of installing the user-exit program in each DB2 instance.

Configuration 3

Before attempting to configure NetBackup for DB2 on UNIX, complete the installation procedure as described in “Installation” on page 13.

The following steps outline the configuration procedure.

1. Configuring the Media Manager
2. Setting the Maximum Jobs per Client Global Attribute
3. Configuring a NetBackup Policy
4. Creating Scripts for DB2 Environment
5. Creating a db2.conf File
6. Configuring the User Environment
7. Testing NetBackup for DB2 on UNIX Configuration Settings

The following sections in this chapter describe each of these steps in detail.

To configure NetBackup for DB2 on UNIX from a Windows NetBackup server, see “Configuration Using the NetBackup Administration Console for Windows” on page 26.

To configure NetBackup for DB2 on UNIX from a UNIX NetBackup server, see “Configuration Using the NetBackup Administration Console for UNIX” on page 41.

Configuration Using the NetBackup Administration Console for Windows

Although the database agent is installed on the NetBackup client, some configuration procedures are performed using the NetBackup Administration Console on the server.

These procedures include:

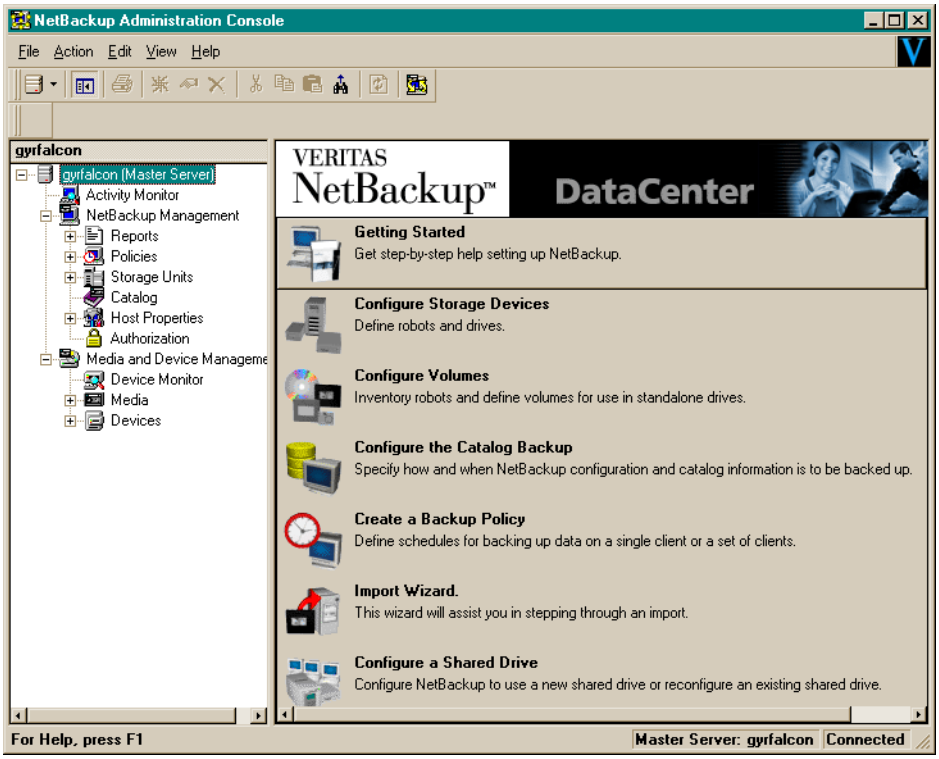
- Configuring the Media Manager
- Setting the Maximum Jobs per Client global attribute
- Configuring a NetBackup policy
- Testing NetBackup for DB2 on UNIX configuration settings

See the next section for instructions on starting the NetBackup Administration Console.

▼ To launch the NetBackup Administration Console for Windows

1. Log on to the server as administrator.
2. From the Windows **Start** menu, point to **Programs**, point to **VERITAS NetBackup** and click **NetBackup Administration Console**.

   The NetBackup Administration Console appears.



Configuring the Media Manager

Use the Media Manager to configure tapes or other storage units for a NetBackup for DB2 on UNIX configuration.

- Refer to the *Media Manager for NetBackup System Administrator's Guide for UNIX* if the NetBackup server is UNIX.
- Refer to the *Media Manager for NetBackup System Administrator's Guide for Windows* if the NetBackup server is Windows.

The number of volumes required will depend on the devices used, the size of the DB2 databases that you are backing up, and the frequency of backups.

Setting the Maximum Jobs per Client Global Attribute

The **Maximum jobs per client** attribute value is figured with the following formula.

`Max Jobs per Client =` *Number of Sessions* `x` *Number of Policies*

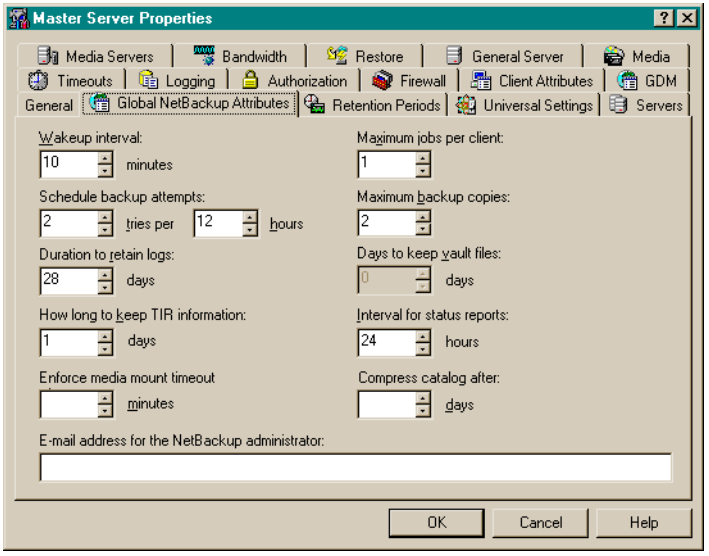
Where:

- *Number of Session* is the number of backup sessions between the backup server and NetBackup on the client. Each separate session starts a new backup job on the client.
- *Number of Policies* is the number of policies that may back up this client at the same time. This number can be greater than one. For example, a client may be in two policies in order to back up two different databases. These backup windows may overlap.

▼ To set the Maximum jobs per client attribute on a Windows server

1. In the left pane of the NetBackup Administration Console, expand **Host Properties**. Select **Master Server**.
2. In the right pane, double-click on the server icon.

   The Master Server Properties dialog box appears.
3. In the Master Server Properties dialog box, click the **Global NetBackup Attributes** tab.



   The default value is 1 for **Maximum jobs per client**.
4. Change the **Maximum jobs per client** value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the **Maximum jobs per client** global attribute.

Configuring a NetBackup Policy

A NetBackup policy defines the backup criteria for a specific group of one or more clients. These criteria include:

- storage unit and media to use
- backup schedules
- script files to be executed on the clients
- clients to be backed up

To use NetBackup for DB2 on UNIX, at least one DB2 policy with the appropriate schedules needs to be defined. A configuration can have a single policy that includes all clients or there can be many policies, some of which include only one client.

Most requirements for DB2 policies are the same as for file system backups. In addition to the attributes described here, there are other attributes for a policy to consider. Refer to the *NetBackup System Administrator's Guide* for detailed configuration instructions and information on all the attributes available.

DB2 Environments

In general, the following NetBackup configuration is required to use NetBackup for DB2 on Windows:

- To backup the DB2 Database:

  Create a DB2 database policy with an Application Backup schedule.

- To schedule a DB2 Backup using NetBackup:

  Create a DB2 database policy with an Automatic Backup schedule.

- To backup the DB2 Archive Log files:

  Create a Standard file policy with a User Backup schedule.

In most DB2 environments, a single DB2 policy can be used. However, in a DB2 EEE environment, a minimum of two (2) DB2 policies are needed: one for the DB2 catalog node(s), and another for the non-catalog nodes. In any DB2 environment where USEREXIT is enabled, a Standard file policy is required.

The following sections describe how to create the NetBackup policies and schedules for these environments. For DB2 EEE users, see "Configuration for an DB2 EEE Environment" on page 99.

Configuring a DB2 Policy

Note The Media Manager must be configured and a Storage Unit defined before a policy can be added.

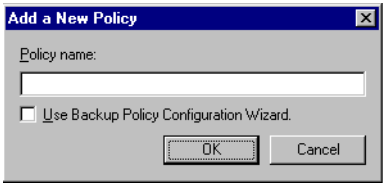
Adding New Policies

Use this procedure when configuring a policy from a Windows server or from a NetBackup Remote Administration Console host.

▼ **To add a new policy**

1. Log on to the server as administrator.
2. Start the NetBackup Administration Console.
3. If your site has more than one master server, choose the one where you want to add the policy.
4. In the left pane, right-click **Policies**. From the menu, select **New Policy**.

   The Add a New Policy dialog box appears.



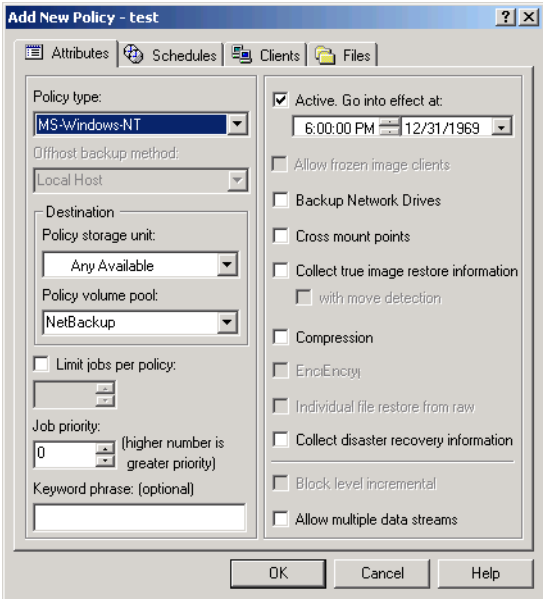
   a. In the **Policy name** box, type a unique name for the new policy.

   b. Choose whether to use the wizard for configuring the policy. The wizard guides you through the setup process and simplifies it by automatically choosing default values that are good for most configurations. If necessary, you can change the defaults later by editing the policy.

      - To use the wizard, select the **Use Backup Policy Configuration Wizard** box and click **OK**. The wizard starts and you create the policy by following the prompts. When prompted, select the DB2 policy type.
      - If you require more control over the settings than the wizard provides, then do not select the **Use Backup Policy Configuration Wizard** box and proceed to step 5.

5. Click **OK**.

A dialog box appears in which you can specify the general attributes for the policy.



6. From the **Policy Type** box, select the DB2 policy type.

7. Complete the entries on the **Attributes** tab as explained in "Description of Attributes."

8. Add other policy information:
   - To add schedules, see "Adding New Schedules."
   - To add scripts, see "Specifying the List of Scripts."
   - To add clients, see "Adding Clients to a Policy."

9. Click **OK**. The new policy will be created.

Description of Attributes

With a few exceptions, NetBackup manages a database backup like a file system backup. Policy attributes that are different for DB2 backups are explained below.

Your other policy attributes will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the policy attributes.

Table 1. Description of Policy Attributes

Attribute	Description
Policy type	Determines the type of clients that can be in the policy and in some cases the types of backups that can be performed on those clients. To use NetBackup for DB2 on UNIX, you must have defined at least one DB2 policy.
Keyword phrase	For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

Adding New Schedules

Each policy has its own set of schedules. These schedules control initiation of automatic backups and also specify when user operations can be initiated.

A DB2 backup requires at least two specific schedule types: an Application Backup schedule and an Automatic Backup schedule. You can also create additional schedules.

The following procedures explain how to configure the required schedule types, and how to add other new schedules.

▼ To configure an Application Backup schedule

1. Double-click on the schedule named **Default-Application-Backup**.

   All DB2 database operations are performed through NetBackup for DB2 on UNIX using an Application Backup schedule. This includes those backups started automatically.

   You must configure an Application Backup schedule for each DB2 policy you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, an Application Backup schedule named **Default-Application-Backup** is automatically created when you configure a new DB2 policy.

2. Specify the other properties for the schedule as explained in "Schedule Properties."

   The backup window for an Application Backup schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the Application Backup schedule starts processes that are required for all NetBackup for DB2 on UNIX backups, including those started automatically.

   For example, assume that you:

- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The Application Backup schedule must have a start time of 0800 and a duration of 14 hours.

Table 2. Example Settings for an Application Backup schedule.

Type of Backup	Schedule settings	Description	Settings
Application Backup	Retention	The length of time backup images are stored.	2 weeks
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 00:00:01 - 23:59:59

Note The Application Backup schedule name must be specified in the $*DB2_Instance_Home* / db2.conf file on the client.

Tip Set the time period for the Application Backup schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for DB2 on UNIX operations are never locked out due to the Application Backup schedule.

▼ To configure an automatic backup schedule

1. In the left pane, right-click on the name of the policy and select **New Schedule** from the menu.

   The Add New Schedule dialog box appears. The title bar shows the name of the policy to which you are adding the schedules.

2. Specify a unique name for the schedule.

3. Select the **Type of Backup**.

For information on the types of backups available for this policy, see “Types of Backups.”

Refer to the following table for recommended settings for an Automatic Backup schedule.

Table 3. Example Settings for an Automatic Backup Schedule.

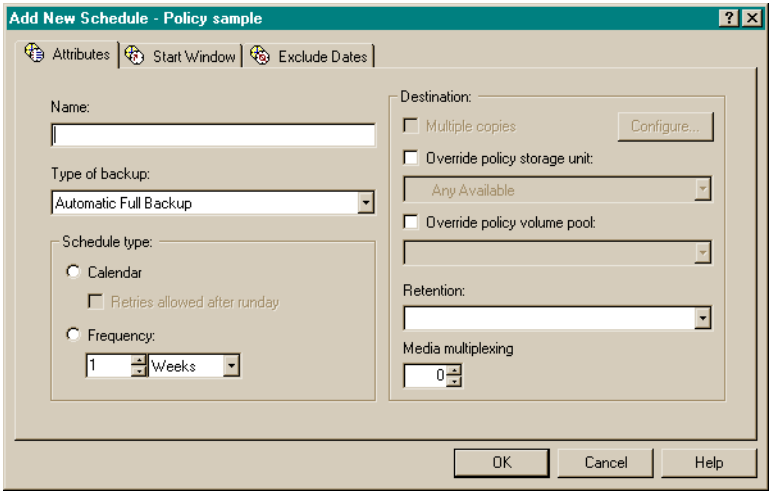
Type of Backup	Schedule settings	Description	Settings
Automatic Backup	Retention	The length of time to store the record of a backup.	2 weeks
	Frequency	Frequency determines how often a backup should be performed	every week
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday, 18:00:00 - 22:00:00

4. Specify the other properties for the schedule as explained in “Schedule Properties.”

▼ To add other schedules

1. In the left pane, right-click on the name of the policy and click **New Schedule**.

   The Add New Schedule dialog appears. The title bar shows the name of the policy to which you are adding the schedule.



2. Specify a unique name for the schedule.

3. Select the **Type of Backup**.

   For information on the types of backups available for this policy, see "Types of Backups."

4. Specify the other properties for the schedule as explained in "Schedule Properties."

5. Click **OK**.

   To add more schedules, repeat this procedure. Click **Cancel** to cancel changes that you have not yet added and close the dialog box.

Types of Backups

Table 4. Description of Backup Types for DB2

Application Backup	The Application Backup schedule enables user-controlled NetBackup operations performed on the client. At least one Application Backup schedule type must be configured for each DB2 policy. The Default-Application-Backup schedule is automatically configured as an Application Backup schedule.
Automatic Backup	An Automatic Backup schedule specifies the dates and times when NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list. If there is more than one client in the DB2 policy, the DB2 scripts are executed on each client.

Schedule Properties

Some of the schedule properties have a different meaning for database backups than for a regular file system backup. These properties are explained below.

Other schedule properties will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the schedule properties.

Table 5. Description of Schedule Properties

Property	Description
Type of backup	Specifies the type of backup that this schedule will control. The selection list shows only the backup types that apply to the policy you are configuring. For more information see "Types of Backups."

Table 5. Description of Schedule Properties

Property	Description
Frequency	This setting is used only for scheduled backups, and not for user-directed backups. **Frequency** specifies the period of time that will elapse until the next backup operation can begin on this schedule. For example, if the frequency is seven days and a successful backup occurs on Wednesday, the next full backup will not occur until the following Wednesday. Normally, incremental backups will have a shorter frequency than full backups.
Calendar	This setting is used only for scheduled backups, and not for user-directed backups. The **Calendar** option allows you to schedule backup operations based on specific dates, recurring week days, or recurring days of the month.
Retention	**Frequency based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. *Therefore, set a retention period that is longer than the frequency setting for the schedule.* For example, if the frequency setting is set to one week, set the retention period to be more than one week. **Calendar based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. However, this setting is not significant for calendar based scheduling.
Multiple copies	If you are licensed for the Inline Tape Copy feature and wish to specify multiple copies for your DB2 policy, configure **Multiple copies** on the Application Backup schedule.

Specifying the List of Scripts

The Scripts list in a database policy has a different meaning than the File list has for other policies. Normally, in a Standard policy, you would list files and directories to be backed up. But since you are now configuring a database policy, you will list scripts.

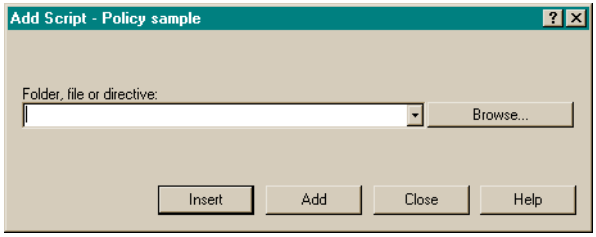
Add scripts only if you are setting up a policy for automatic scheduling. All scripts listed in the Scripts list will be executed for the Automatic Backup schedules as specified under the **Schedules** tab.

All scripts specified in the Scripts list are executed during manual or automatic backups. NetBackup will start backups by running the scripts in the order that they appear in the Scripts list.

▼ To add scripts to the Scripts List

1. In the left pane of the NetBackup Administration Console, right-click on the policy name and click **New Script**.

   A dialog box appears. The title bar shows the name of the policy to which you are adding the scripts.



2. Type the name of the NetBackup for DB2 script.

   Be sure to specify the full pathname when listing DB2 scripts. For example:

   `/myscripts/db2_offline_backup.sh`

   Refer to “Creating Scripts for DB2 Environment” on page 57 for details on creating scripts.

   Be sure that the DB2 scripts listed here are installed on each client in the Client list.

3. Click **Add**.

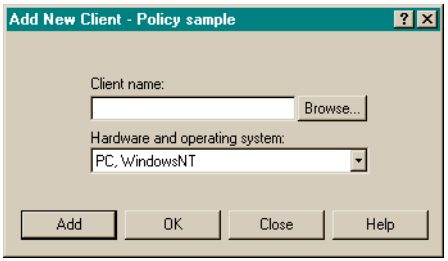
Adding Clients to a Policy

The client list is the list of clients on which your DB2 scripts will be executed during an automatic backup. A NetBackup client must be in at least one policy but can be in more than one.

▼ To add clients to a policy

1. In the left pane of the NetBackup Administration Console, right-click on the policy name and click **New Client**.

   The Add New Client dialog box appears. The title bar shows the name of the policy to which you are adding the clients.



2. In the **Client name** text box, type the name of the client that you are adding.

   On the client the following should be installed:

   - DB2
   - NetBackup client or server
   - NetBackup for DB2 on UNIX
   - the backup or restore script(s)

3. Choose the hardware and operating system type.

4. Click **Add**.

5. To add another client, repeat step 2 through step 4. If this is the last client, click **Close** to close the dialog box.

Configuring a Standard Policy

In addition to the DB2 policy, you must also configure a Standard type policy. A Standard policy will enable the backup of database log files.

A Standard type policy must be added when:

- `userexit` for logging is turned on in DB2 UDB.
- Client is a UNIX machine.

Note The name of the policy must be specified in the *$DB2_Instance_Home*`/db2.conf` file on the client.

▼ To Create a Standard Policy

1. Add a new policy, as specified in "Configuring a NetBackup Policy" on page 29.
2. Specify the general attributes for the policy:
   a. Select Standard for the policy type.
   b. Specify other attributes as desired.
3. Add a schedule:
   a. Type the name of your schedule.

Note This schedule name must be specified in the *$DB2_Instance_Home*/db2.conf file on the client.

   b. In the **Type of Backup** box, select User Backup.

      This is a user backup that is started by the NetBackup for DB2 on UNIX user-exit program on the client. This schedule specifies the criteria for DB2 archive logs file backups. A User Backup schedule enables user controlled NetBackup operations performed on the client.

   c. In the **Retention** box, set the time period needed to retain two full backups of your database.

      For example, if your database is backed up once every Sunday morning, select a retention period of at least two weeks.

   d. In the **Start Window** section of the **Schedules** dialog, set the time of day when you want backups to occur.

      This schedule must encompass *all of the time periods* during which DB2 UDB can call the user-exit programs.

Note You do not configure a file list for this policy because it will be a User Backup type schedule.

4. Specify the clients that you will be backing up. The client must have:
   - DB2 UDB installed
   - NetBackup for DB2 on UNIX installed
5. Click **OK**.

The Add New Policy dialog box closes. The policy you just configured appears in the policy list.

Configuration Using the NetBackup Administration Console for UNIX

Although the database agent is installed on the NetBackup client, some configuration procedures are performed using the NetBackup Administration Console on the server.

These procedures include:

- Configuring the Media Manager
- Setting the Maximum Jobs per Client global attribute
- Configuring a NetBackup policy
- Testing NetBackup for DB2 on UNIX configuration settings

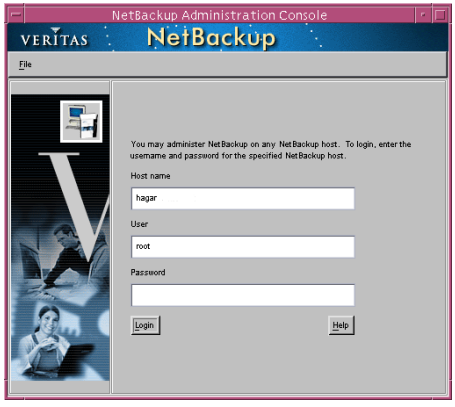
See the next section for instructions on starting the NetBackup Administration Console.

▼ To launch the NetBackup Administration Console for UNIX

1. Log onto the UNIX server as root.
2. Start the NetBackup Administration Console by executing:

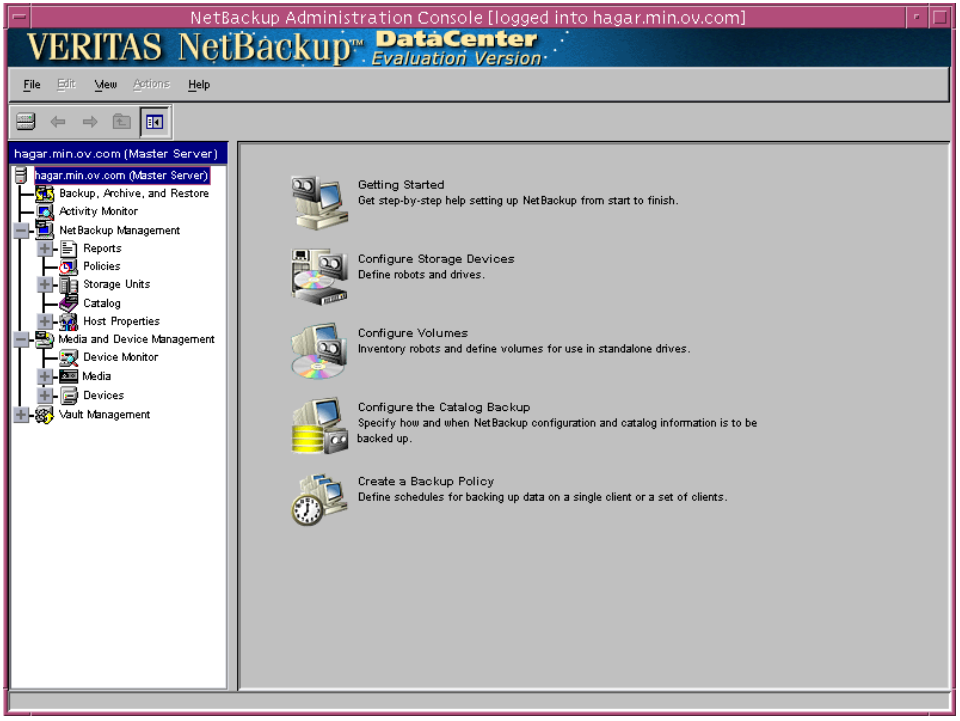
   install_path`/netbackup/bin/jnbSA &`

   The Login dialog box appears.



3. Type the name of the master server where you initially want to manage NetBackup. You can specify any NetBackup master server. Indicate the User and Password.

4. Click **Login**. The NetBackup Administration Console appears.


NetBackup Administration Console [logged into hagar.min.ov.com]
VERITAS NetBackup™ DataCenter Evaluation Version
File Edit View Actions Help
hagar.min.ov.com (Master Server)
hagar.min.ov.com (Master Server)
Backup, Archive, and Restore
Activity Monitor
NetBackup Management
Reports
Policies
Storage Units
Catalog
Host Properties
Media and Device Management
Device Monitor
Media
Devices
Vault Management
Getting Started
Get step-by-step help setting up NetBackup from start to finish.
Configure Storage Devices
Define robots and drives.
Configure Volumes
Inventory robots and define volumes for use in standalone drives.
Configure the Catalog Backup
Specify how and when NetBackup configuration and catalog information is to be backed up.
Create a Backup Policy
Define schedules for backing up data on a single client or a set of clients.

Configuring the Media Manager

Use the Media Manager to configure tapes or other storage units for a NetBackup for DB2 on UNIX configuration.

- Refer to the *Media Manager for NetBackup System Administrator's Guide for UNIX* if the NetBackup server is UNIX.
- Refer to the *Media Manager for NetBackup System Administrator's Guide for Windows* if the NetBackup server is Windows.

The number of volumes required will depend on the devices used, the size of the DB2 databases that you are backing up, and the frequency of backups.

Setting the Maximum Jobs per Client Global Attribute

The **Maximum jobs per client** attribute value is figured with the following formula.

`Max Jobs per Client =` *Number of Sessions* `x` *Number of Policies*

Where:

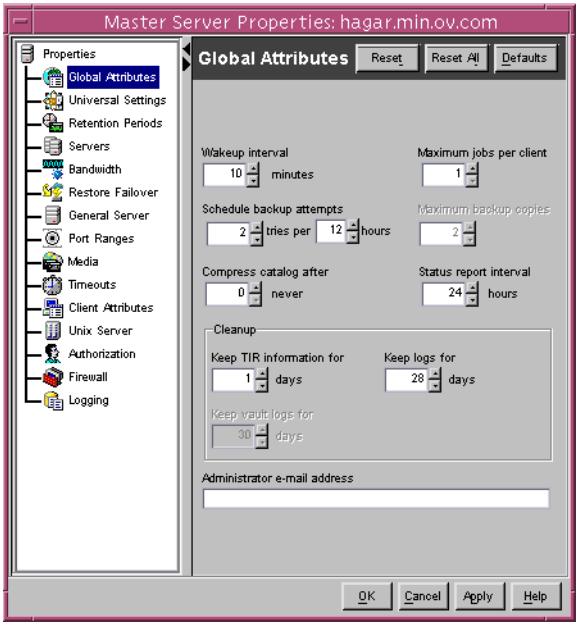
- *Number of Session* is the number of backup sessions between the backup server and NetBackup on the client. Each separate session starts a new backup job on the client.
- *Number of Policies* is the number of policies that may back up this client at the same time. This number can be greater than one. For example, a client may be in two policies in order to back up two different databases. These backup windows may overlap.

▼ To set the Maximum jobs per client attribute on a UNIX server

Use this procedure to set the **Maximum jobs per client** global attribute using the NetBackup Administration Console - Java interface on a Java-capable platform.

1. In the left pane of the NetBackup Administration Console, expand **Host Properties**. Select **Master Servers**.
2. In the right pane, double-click on the server icon. Click **Global Attributes**.

   The Master Server Properties dialog box appears.



   The default value is 1 for **Maximum jobs per client**.

3. Change the **Maximum jobs per client** value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the **Maximum jobs per client** global attribute.

Configuring a NetBackup Policy

A NetBackup policy defines the backup criteria for a specific group of one or more clients. These criteria include:

- storage unit and media to use
- backup schedules
- script files to be executed on the clients
- clients to be backed up

To use NetBackup for DB2 on UNIX, at least one DB2 policy with the appropriate schedules needs to be defined. A configuration can have a single policy that includes all clients or there can be many policies, some of which include only one client.

Most requirements for DB2 policies are the same as for file system backups. In addition to the attributes described here, there are other attributes for a policy to consider. Refer to the *NetBackup System Administrator's Guide* for detailed configuration instructions and information on all the attributes available.

DB2 Environments

In general, the following NetBackup configuration is required to use NetBackup for DB2 on Windows:

- To backup the DB2 Database:

  Create a DB2 database policy with an Application Backup schedule.

- To schedule a DB2 Backup using NetBackup:

  Create a DB2 database policy with an Automatic Backup schedule.

- To backup the DB2 Archive Log files:

  Create a Standard file policy with a User Backup schedule.

In most DB2 environments, a single DB2 policy can be used. However, in a DB2 EEE environment, a minimum of two (2) DB2 policies are needed: one for the DB2 catalog node(s), and another for the non-catalog nodes. In any DB2 environment where USEREXIT is enabled, a Standard file policy is required.

The following sections describe how to create the NetBackup policies and schedules for these environments. For DB2 EEE users, see “Configuration for an DB2 EEE Environment” on page 99.

Configuring a DB2 Policy

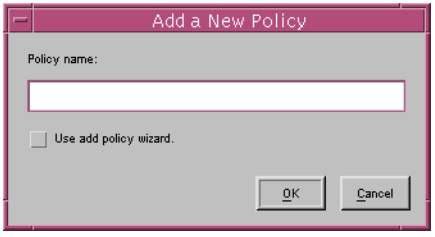
Note The Media Manager must be configured and a Storage Unit defined before a policy can be added.

Use this procedure when configuring a policy from a UNIX server.

▼ To add a new policy

1. Log onto the server as root.
2. Start the NetBackup Administration Console.
3. If your site has more than one master server, choose the one to which you want to add the policy.
4. In the left pane, click on **Policies**. The right pane splits into a All Policies pane and a details pane.
5. In the All Policies pane, right-click on the Master Server, and click **New**.

   The Add a New Policy dialog box appears.



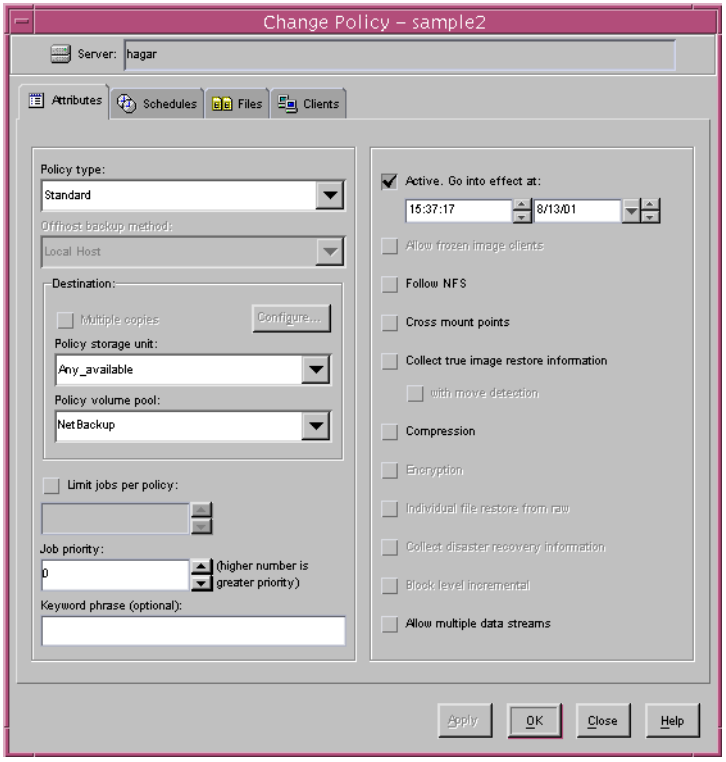
   a. In the **Policy name** box, type a unique name for the new policy.

   b. Choose whether to use the wizard for configuring the policy. The wizard guides you through the setup process and simplifies it by automatically choosing default values that are good for most configurations. If necessary, you can change the defaults later by editing the policy.

- To use the wizard, select the **Use add policy wizard** box and click **OK**. The wizard starts and you create the policy by following the prompts. When prompted, select the DB2 policy type.
- If you require more control over the settings than the wizard provides, do not select the **Use add policy wizard box** and proceed to step 6.

6. Click **OK**.

   A dialog box appears in which you can specify the general attributes for the policy.



7. From the **Policy type** box, select the DB2 policy type.

8. Complete the entries on the **Attributes** tab as explained in "Description of Attributes" and click **Apply** to save the attribute entries.

9. Add other policy information:
   - To add schedules, see "Adding New Schedules."
   - To add scripts, see "Specifying the List of Scripts."

- To add clients, see "Adding Clients to a Policy."

Description of Attributes

With a few exceptions, NetBackup manages a database backup like a file system backup. Policy attributes that are different for DB2 backups are explained below.

Your other policy attributes will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the policy attributes.

Table 6. Description of Policy Attributes

Attribute	Description
Policy type	Determines the type of clients that can be in the policy and in some cases the types of backups that can be performed on those clients. To use NetBackup for DB2 on UNIX, you must have defined at least one DB2 policy.
Keyword phrase	For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

Adding New Schedules

Each policy has its own set of schedules. These schedules control initiation of automatic backups and also specify when user operations can be initiated.

A DB2 backup requires at least two specific schedule types: an Application Backup schedule and an Automatic Backup schedule. You can also create additional schedules.

The following procedures explain how to configure the required schedule types, and how to add other new schedules.

▼ To configure an Application Backup schedule

1. Under the policy name, select **Schedules**.
2. In the right pane, double-click on the schedule named **Default-Application-Backup**.

   A dialog box appears. The title bar shows the name of the policy to which you are adding the schedule.

   All DB2 database operations are performed through NetBackup for DB2 on UNIX using an Application Backup schedule. This includes those backups started automatically.

You must configure an Application Backup schedule for each DB2 policy you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, an Application Backup schedule named Default-Application-Backup is automatically created when you configure a new DB2 policy.

3. Specify the other properties for the schedule as explained in "Schedule Properties."

The backup window for an Application Backup schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the Application Backup schedule starts processes that are required for all NetBackup for DB2 on UNIX backups, including those started automatically.

For example, assume that you:

- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The Application Backup schedule must have a start time of 0800 and a duration of 14 hours.

Tip Set the time period for the Application Backup schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for DB2 on UNIX operations are never locked out due to the Application Backup schedule.

Table 7. Example Settings for an Application Backup schedule.

Type of Backup	Schedule settings	Description	Settings
Application Backup	Retention	The length of time backup images are stored.	2 weeks
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 00:00:01 - 23:59:59

Note The Application Backup schedule name must be specified in the *$DB2_Instance_Home*`/db2.conf` file on the client.

▼ To configure an automatic backup schedule

1. In the All Policies pane, expand the policy you wish to configure. Right-click **Schedules** and choose **New**.

   A dialog box appears. The title bar shows the name of the policy to which you are adding the schedules.

2. Specify a unique name for the schedule.

3. Select the **Type of Backup**.

   For information on the types of backups available for this policy, see "Types of Backups."

   Refer to the following tables for recommended settings for an Automatic Backup schedule.

Table 8. Example Settings for a Automatic Backup Schedule.

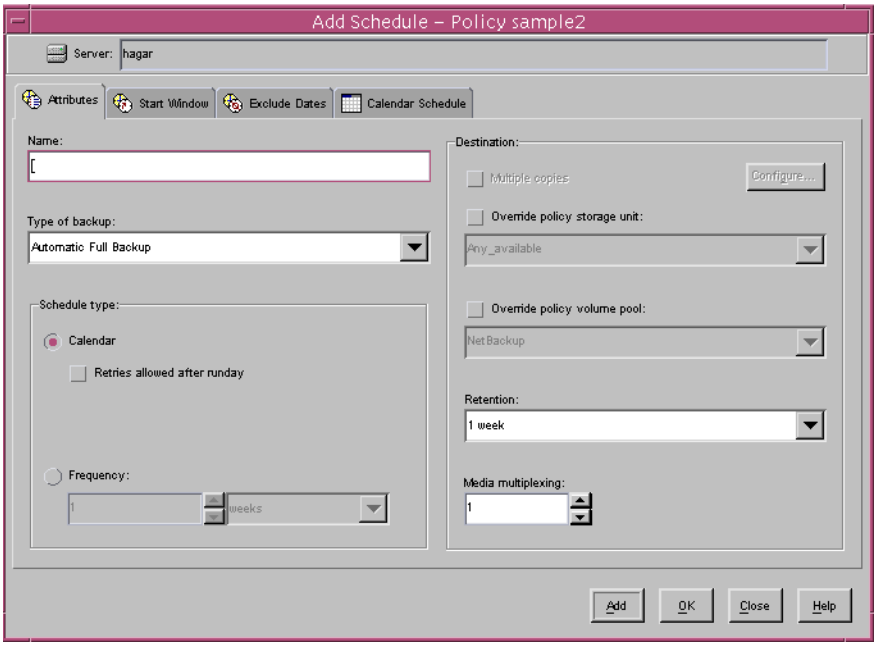
Type of Backup	Schedule settings	Description	Settings
Automatic Backup	Retention	The length of time to store the record of a backup.	2 weeks
	Frequency	Frequency determines how often a backup should be performed	every week
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday, 18:00:00 - 22:00:00

4. Specify the other properties for the schedule as explained in "Schedule Properties."

▼ To add other schedules

1. In the left pane, right-click on the name of the policy and select **New Schedule** from the menu.

   The Add Schedule dialog box appears. The title bar shows the name of the policy to which you are adding the schedules.



2. Specify a unique name for the schedule.

3. Select the **Type of Backup**.

   For information on the types of backups available for this policy, see "Types of Backups."

4. Specify the other properties for the schedule as explained in "Schedule Properties."

5. If this is the last schedule, click **OK**. To add more schedules, click **Add** and repeat step 2 through step 4. Click **Close** to cancel changes that you have not yet added and close the dialog box.

Types of Backups

Table 9. Description of Backup Types for DB2

Application Backup	The Application Backup schedule enables user-controlled NetBackup operations performed on the client. At least one Application Backup schedule type must be configured for each DB2 policy. The Default-Application-Backup schedule is automatically configured as an Application Backup schedule.
Automatic Backup	An Automatic Backup schedule specifies the dates and times when NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list. If there is more than one client in the DB2 policy, the DB2 scripts are executed on each client.

Schedule Properties

Some of the schedule properties have a different meaning for database backups than for a regular file system backup. These properties are explained below.

Other schedule properties will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the schedule properties.

Table 10. Description of Schedule Properties

Property	Description
Type of backup	Specifies the type of backup that this schedule will control. The selection list shows only the backup types that apply to the policy you are configuring. For more information see "Types of Backups."
Frequency	This setting is used only for scheduled backups, and not for user-directed backups. **Frequency** specifies the period of time that will elapse until the next backup operation can begin on this schedule. For example, if the frequency is seven days and a successful backup occurs on Wednesday, the next full backup will not occur until the following Wednesday. Normally, incremental backups will have a shorter frequency than full backups.
Calendar	This setting is used only for scheduled backups, and not for user-directed backups. The **Calendar** option allows you to schedule backup operations based on specific dates, recurring week days, or recurring days of the month.

Table 10. Description of Schedule Properties

Property	Description
Retention	**Frequency based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. *Therefore, set a retention period that is longer than the frequency setting for the schedule.* For example, if the frequency setting is set to one week, set the retention period to be more than one week. **Calendar based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. However, this setting is not significant for calendar based scheduling.
Multiple copies	If you are licensed for the Inline Tape Copy feature and wish to specify multiple copies for your DB2 policy, configure **Multiple copies** on the Application Backup schedule.

Specifying the List of Scripts

The File list in a database policy has a different meaning than the File list has for other policies. Normally, in a Standard policy, you would list files and directories to be backed up. But since you are now configuring a database policy, you will list scripts.

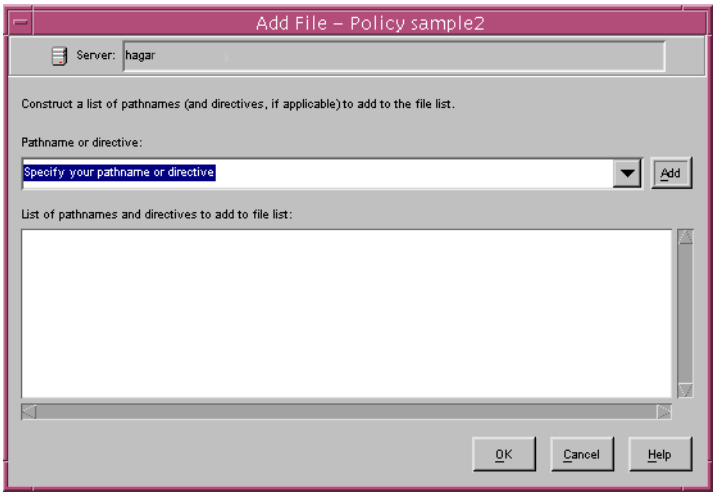
Add scripts only if you are setting up a policy for automatic scheduling. All scripts listed in the Files list will be executed for the Automatic Backup schedules as specified under the **Schedules** tab.

All scripts specified in the Files list are executed during manual or automatic backups. NetBackup will start backups by running the scripts in the order that they appear in the Files list.

▼ To add scripts to the Scripts List

1. In the left pane, click **Policies**.
2. In the All Policies pane, expand the policy you want to add the scripts.
3. Right-click on **Files** and choose **New**.

   The Add File dialog box appears. The title bar shows the name of the policy to which you are adding the scripts.


Add File – Policy sample2
Server:
hagar
Construct a list of pathnames (and directives, if applicable) to add to the file list.
Pathname or directive:
Specify your pathname or directive
Add
List of pathnames and directives to add to file list:
OK
Cancel
Help

4. Type the name of the DB2 script.

   Be sure to specify the full pathname when listing DB2 scripts. For example:

   `/myscripts/db2_offline_backup.sh`

   Be sure that the DB2 scripts listed here are installed on each client in the Client list.
5. Click **Add**.
6. To add more scripts, repeat step 4 and step 5.

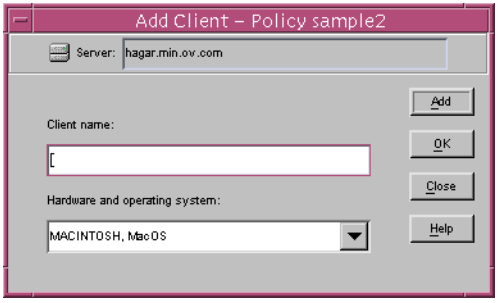
Adding Clients to a Policy

The client list is the list of clients on which your NetBackup for DB2 on UNIX backups will be performed. A NetBackup client must be in at least one policy but can be in more than one.

▼ To add clients to a policy

1. In the left pane, expand **Policies**.
2. In the All Policies pane, expand the policy you wish to configure.
3. Right-click on **Clients** and choose **New**.

   The Add Client dialog box appears. The title bar shows the name of the policy where you are adding clients.



4. In the **Client name** text box, type the name of the client that you are adding.

   On the client the following should be installed:

   - DB2
   - NetBackup client or server
   - NetBackup for DB2 on UNIX
   - the backup or restore script(s)

5. Choose the hardware and operating system type and click **Add**.
6. If this is the last client, click **OK**. If you are going to add more clients, repeat step 4 and step 5.

Configuring a Standard Policy

In addition to the DB2 policy, you must also configure a Standard type policy. A Standard policy will enable the backup of database log files.

A Standard type policy must be added when:

- `userexit` for logging is turned on in DB2 UDB.

- Client is a UNIX machine.

Note The name of the policy must be specified in the *$DB2_Instance_Home*/db2.conf file on the client.

▼ To Create a Standard Policy

1. Add a new policy, as specified in "Configuring a NetBackup Policy" on page 29.
2. Specify the general attributes for the policy:
   a. Select Standard for the policy type.
   b. Specify other attributes as desired.
3. Add a schedule:
   a. Type the name of your schedule.

Note This schedule name must be specified in the *$DB2_Instance_Home*/db2.conf file on the client.

   b. In the **Type of Backup** box, select User Backup.

      This is a user backup that is started by the NetBackup for DB2 on UNIX user-exit program on the client. This schedule specifies the criteria for DB2 archive logs file backups. A User Backup schedule enables user controlled NetBackup operations performed on the client.

   c. In the **Retention** box, set the time period needed to retain two full backups of your database.

      For example, if your database is backed up once every Sunday morning, select a retention period of at least two weeks.

   d. In the **Start Window** section of the **Schedules** dialog, set the time of day when you want backups to occur.

      This schedule must encompass *all of the time periods* during which DB2 UDB can call the user-exit programs.

Note You do not configure a file list for this policy because it will be a User Backup type schedule.

4. Specify the clients that you will be backing up. The client must have:

- DB2 UDB installed
- NetBackup for DB2 on UNIX installed

5. Click **OK**.

   The Add New Policy dialog box closes. The policy you just configured appears in the policy list.

Creating Scripts for DB2 Environment

Note For more information on scripts, see the *DB2 Commands User's Guide*.

The following example scripts were included with the NetBackup for DB2 on UNIX installation:

```
db2_offline_backup.sh
db2_restore.sh
db2_all_backup_mpp.sh
db2_all_restore_mpp.sh
```

These scripts were provided as examples. They are installed in the following directory:

install_path/netbackup/ext/db_ext/db2/scripts

where *install_path* is /usr/openv by default.

Note Be sure to modify these scripts for your environment. Do not store your scripts in the sample directory, as they will be lost when upgrading or re-installing. Always relocate your scripts to a safe location.

Although each script can have multiple DB2 commands operations, a separate script is required for each type of operation. For example, you need separate scripts for backups and restores.

Caution Always specify the correct script when configuring automatic backups or when starting operations through NetBackup. NetBackup for DB2 on UNIX will not generate an error if a restore script is used for a backup operation or a backup script is used for a restore operation.

Instructions for Modifying Scripts

Note If you do not include an su - user (user is the DB2 administrator account) in your scripts, they will not run with the proper permissions and environmental variables. The result will be problems with your database backups or restores.

Note If you are using DB2 EEE, see "Creating DB2 Scripts for DB2 EEE Environment" on page 104.

1. Copy the example scripts to a different directory on your client. DB2 scripts can be located anywhere on the client.

2. Set the access permissions of these scripts to 775.

   `chmod 775 script_name`

3. Modify the script

   a. Use a text editor such as vi to open the script.

   b. Follow the instructions in the script.

Note Test the scripts you just created by starting a manual backup of this policy as explained in "Testing NetBackup for DB2 on UNIX Configuration Settings" on page 67.

The following example shows the sample script:

install_path/ext/db_ext/db2/scripts/db2_offline_backup.sh

```
#!/bin/sh
#
#This environment variable are created by Netbackup (bphdb)
#

echo "DB2_SCHEDULED = $DB2_SCHEDULED"
echo "DB2_USER_INITIATED = $DB2_USER_INITIATED"
echo "DB2_SERVER = $DB2_SERVER"
echo "DB2_POLICY = $DB2_POLICY"

RETURN_STATUS=0

CMD_LINE=""

#
# Full offline backup
#
# Change nbdb2.lib below to the correct NetBackup library name for your host:
#  Solaris-32 = nbdb2.so
#  Solaris-64 = nbdb2.so64
#  AIX-32 = nbdb2.sl
#  AIX-64 = nbdb2.sl64

CMD_LINE="DB2 BACKUP DATABASE sample LOAD /usr/openv/netbackup/bin/nbdb2.lib
OPEN 2 SESSIONS WITH 4 BUFFERS
```

```
#
# The username on the "su" command needs to be replaced with the correct
# user name.
#
echo "Execute $CMD_LINE"
su - db2inst1 -c "$CMD_LINE"

RETURN_STATUS=$?

exit $RETURN_STATUS
```

Script Parameters

Parameters are necessary in DB2 scripts to enable the DB2 commands to perform backup and restore operations. The parameters can come from one of these sources:

- Environmental Variables
- NetBackup `bp.conf`
- NetBackup `db2.conf`

Parameters from these sources can be evaluated within the scripts. For example, the DB2_POLICY value is the name of the policy used to perform the backup.

Environmental Variables

It is important to note that these environmental variables are created locally when a DB2 script is executed through:

- the NetBackup automatic scheduler
- a user-directed backup process

When the NetBackup automatic scheduler calls a DB2 script, the following environmental variables are created.

DB2_POLICY	Name of the DB2 policy from which the Automatic Backup backup type was started. This policy name is not necessarily the same policy name that is in the bp.conf file or the db2.conf file. This variable is set only if the backup is initiated from the server (either automatically by the NetBackup scheduler or manually through the administrator interface). **Note** When a DB2 script is started from the Graphical User Interface client all of the same variables are created except for *DB2_POLICY* variable.
DB2_SERVER	Name of the NetBackup server.
DB2_SCHED	Name of the Automatic Backup backup type. This variable is set up only if the backup is initiated from the server (either automatically by the NetBackup scheduler or manually through the administrator interface).
DB2_SCHEDULED	Set to 1 if this is a scheduled backup type (Automatic Backup).
DB2_USER_INITIATED	Set to 1 if this is a user-initiated backup type (Application Backup backup).
DB2_FULL	Set to 1 for a full backup.
DB2_INCR	Set to 1 for an incremental backup

Note The above environmental variables are only used in the executing script. They are unknown to the DB2 UDB backup / restore. For example, the DB2_POLICY variable will not be processed by the DB2 UDB backup or DB2 UDB restore. Instead it uses the POLICY name defined in the *install_path*/netbackup/bin/bp.conf file or the *$DB2_Instance_Home*/db2.conf file.

Creating a db2.conf File

A db2.conf file is a control file that indicates what policy, schedule, and database to use. You must place this file in the *$DB2_Instance_Home/* directory on all the NetBackup for DB2 on UNIX clients. A sample copy is provided in the sample directory.

Example

Assume we are backing up a database named *SAMPLE* and its archive logs. We have already configured two policies that have the required schedules for our backups.

One of the policies is for backing up the database. This policy is named *DB2_DB_Policy* and has both an Application Backup schedule and an Automatic Backup schedule. The first entry in the example file below specifies this policy and its Application Backup schedule, which is named *Default-Application-Backup*. The Automatic Backup schedule is not specified in db2.conf.

The other policy is for backing up the archive logs. This policy is named *DB2_Log_Policy* and has a User Backup type schedule named *User*. The second entry in the example file below specifies this policy and its User Backup schedule.

```
#
# The following settings are used by NetBackup to backup/restore a DB2 database.
#
# Reminders:
# 1) The specified policy must have a type of "DB2".
# 2) The specified schedule must be defined for this policy.
# 3) The DB2 database host must be entered as a client for this policy.
#

OBJECTTYPE DATABASE
DATABASE SAMPLE
POLICY DB2_DB_Policy
SCHEDULE Default-Application-Backup
ENDOPER

#
# The following settings are used by NetBackup to backup/restore DB2 log files.
#
# Reminders:
# 1) The specified policy must have a type of "Standard" (for UNIX DB2 host) or
#    "MS-Windows-NT" (for Windows DB2 host).
# 2) The specified schedule must be defined for this policy.
# 3) The DB2 database host must be entered as a client for this policy.
#
# If DB2 log file archiving is enabled (DB2 USEREXIT ON), DB2 will invoke
# the NetBackup user-exit program to backup & restore DB2 archive log files.
```

```
# Using ARCFUNC SAVE causes log files to be archived to NetBackup storage,
# as specified by the policy.
# Using ARCFUNC COPY causes log files to be archived to a disk directory.
# Use ARCDIR to specify the destination directory for log file backup.
# Use RETDIR to specify the source directory for log file restore.
#

OBJECTTYPE ARCHIVE
DATABASE SAMPLE
POLICY DB2_Log_Policy
SCHEDULE User
ARCFUNC SAVE
#ARCFUNC COPY
#ARCDIR /home/db2inst1/arcdir
#RETDIR /home/db2inst1/arcdir
ENDOPER
```

Using ARCFUNC to Backup Archive Logs

ARCFUNC can be used with two options: SAVE and COPY. The default option is SAVE.

When using ARCFUNC SAVE, the name of the Standard policy configured earlier (see "Configuring a Standard Policy" on page 54) must be recorded in the db2.conf file.

The following is an example of a db2.conf file for backing up archive log files for the database SAMPLE using ARCFUNC SAVE. The policy name is db2_archive and the schedule name is db2_archive_sched

```
DATABASE SAMPLE
OBJECTTYPE ARCHIVE
POLICY db2_archive
SCHEDULE db2_archive_sched
ARCFUNC SAVE
ENDOPER
```

The ARCFUNC COPY function is different. It is a straight copy of the archive log(s) to the ARCDIR. There is no NetBackup policy or schedule involved or needed. The user exit program (db2uext2) does the copy operation when called by DB2. However, you must setup ARCDIR and the RETDIR in the db2.conf file for the operation to function properly. The following example shows contents of a db2.conf file for the database SAMPLE.

```
DATABASE SAMPLE
OBJECTTYPE ARCHIVE
ARCFUNC copy
ARCDIR /mylogs/arcdir/
```

```
RETDIR /mylogs/arcdir/
ENDOPER
```

At some point, the disk will become full with archived log files. To manage this, you need to configure a separate Standard policy to archive the entire ARCDIR directory to NetBackup storage. To reclaim the disk space, the policy must use a "User Archive" schedule type. This instructs NetBackup to delete the files after they have been successfully backed up. Refer to the NetBackup System Adminstrator's Guide for more information about User Archive schedules.

Note This policy is managed by NetBackup only and has nothing to do with the db2.conf file.

Using ARCFUNC During Restore of Archive Log Files

If your database is restored to a rollforward pending state, execute a ROLLFORWARD DATABASE command. DB2 will request the archive log files it needs to do the rollforward. DB2 will perform the rollforward through the user exit program.

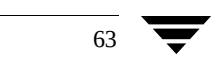
When a restore request comes in from DB2 and the ARCFUNC option is SAVE, the user exit program will look for the file from tape or other device you setup for backup. When using this option, you will not need to worry about the ARCDIR or RETDIR options.

When the option for ARCFUNC is COPY, the user exit program will look for the file to restore from the RETDIR you specified in the db2.conf file. If some or all of the files have been archived to NetBackup storage, you must restore them to the RETDIR directory before performing a ROLLFORWARD DATABASE command. See the "Performing Restores" section in the NetBackup User's Guide for detailed instructions regarding how to restore a file to disk. The ROLLFORWARD DATABASE command will request the log files that DB2 needs from the user exit program. The user exit program will look in the RETDIR to find the file since the option for ARCFUNC is COPY. The user exit program will then copy the files to the DB2 primary log directory.

Important Points

Remember the following about the db2.conf file.

- A different POLICY name needs to be specified for DATABASE and ARCHIVE objects.
- A db2.conf consists of a series of entries that define the policy and schedule based upon the OBJECTTYPE.
- OBJECTTYPE and POLICY are required fields and all other fields are optional.
- Each operation consists of a series of *keyword, value* pairs, which completely define the total action.



- The keyword is not case sensitive, but the value is.
- Entries are not nested.
- Within an entry, the *keyword, value* pairs can appear in any order. Each entry must be terminated by ENDOPER.
- Any line with a # in the first column is treated as a comment line.

Keywords

The following table describes the keywords and values used in db2.conf file.

Keyword	Value	Required	Default	Description
ARCDIR	*directory path*	yes, if the value for ARCFUNC is COPY no, if the value for ARCFUNC is SAVE	none	directory path name where archive logs are moved to.
ARCFUNC	SAVE | COPY	no	SAVE	Only for OBJECTTYPE is ARCHIVE. SAVE saves a backup / restore archive log to / from NetBackup. COPY copies an archive to / from ARCDIR / RETDIR directories.
POLICY	*NB policyname*	yes	none	NetBackup policy name.
DATABASE	*database_name*	no	none	DB2 database name. If OBJECTTYPE is ARCHIVE, then a Standard policy must be specified. If OBJECTTYPE is DATABASE or TABLESPACE, then a DB2 policy must be specified.
ENDOPER	none	yes	none	Terminates each entry.
OBJECTTYPE	DATABASE TABLESPACE ARCHIVE	yes	none	Type of backup / restore being performed. TABLESPACE are for DB2 policy types. ARCHIVE is for the Standard policy type.
RETDIR	*directory path*	yes if the value for ARCFUNC is COPY no if the value for ARCFUNC is SAVE	none	The directory path name where archive logs are retrieved from.
SCHEDULE	*nb schedname*	no	first Application Backup in policy	NetBackup schedule name in policy.
NORETRY	*(none)*	no	none	Obsolete: only use under the supervision of NetBackup support personnel

Configuring the User Environment

The NetBackup for DB2 on UNIX variables can be set for use in the user environment. These variables are:

`DB2_POLICY`

`DB2_SERVER`

`DB2_SCHED`

For a description of these variables, see “Environmental Variables” on page 59.

Testing NetBackup for DB2 on UNIX Configuration Settings

After you have configured the master server for NetBackup for DB2 on UNIX, you should test the configuration settings. For a description of status codes, refer to the *NetBackup Troubleshooting Guide for Windows* if you are using a Windows server or the *NetBackup Troubleshooting Guide for UNIX* if you are using a UNIX server.

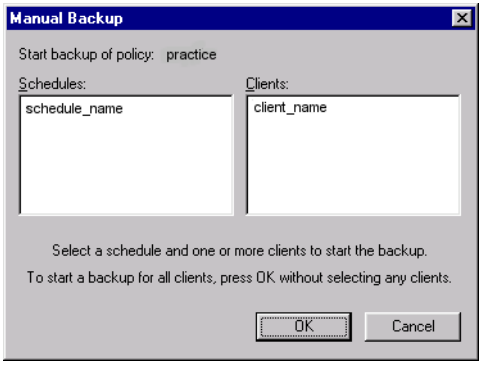
NetBackup Administration Console for Windows

Use this procedure to test a policy configuration from a Windows server or from the Remote Administration Console.

▼ To test the configuration settings on a Windows server

1. Log onto the server as administrator.
2. Start the NetBackup Administration Console.
3. In the left pane, click **Policies**. The policy list appears in the right pane.
4. Click on the policy you wish to test.
5. From the **Actions** menu, click **Manual Backup**.

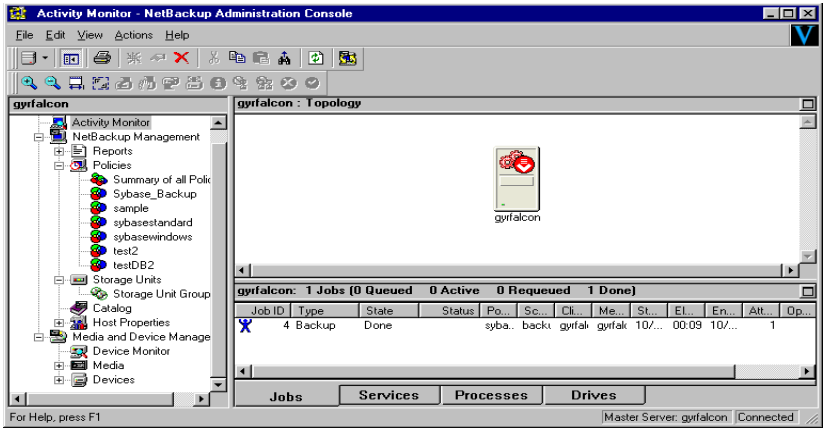
   The Manual Backup dialog box appears.



   The Schedules pane contains the name of a schedule (or schedules) configured for the policy you are going to test. The Clients pane contains the name of the client(s) listed in the policy you are going to test.

6. Follow the instructions on the dialog box.

7. Click **Activity Monitor** on the NetBackup Administration Console.



If the manual backup does not exit with a successful status, refer to the Troubleshooting chapter.

NetBackup Administration Console for UNIX

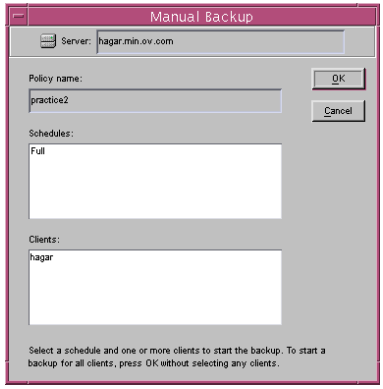
Use this procedure to test a policy configuration on the NetBackup Administration Console for UNIX.

▼ To test the configuration settings on a UNIX server

1. Log onto the server as root.
2. Start the NetBackup Administration Console.
3. In the left pane, click **Policies**.

   The right pane splits into an All Policies pane and a details pane.
4. In the All Policies pane, click the policy you wish to test.
5. From the **Actions** menu, click **Manual Backup**.

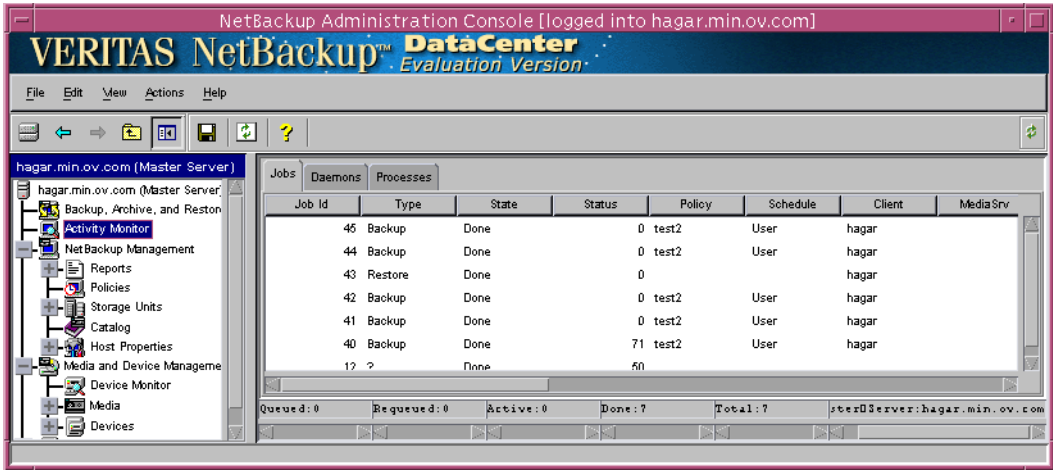
The Manual Backup dialog box appears.



The Schedules pane contains the name of a schedule (or schedules) configured for the policy you are going to test. The Clients pane contains the name of the client(s) listed in the policy you are going to test.

6. Follow the instructions on the dialog box.

7. Click **Activity Monitor** on the NetBackup Administration Console.



If the manual backup does not exit with a successful status, refer to the Troubleshooting chapter.

Using NetBackup for DB2 on UNIX 4

When all installation and configuration is complete, you can start DB2 backups and restores through NetBackup or execute DB2 UDB commands directly.

Caution Always specify the correct DB2 script when configuring automatic backups or when starting operations through NetBackup (see the Configuration chapter). NetBackup for DB2 on UNIX will not generate an error if a restore DB2 script file is used for a backup operation or a backup DB2 script is used for a restore operation.

Performing a Backup

There are two types of DB2 backups: database and archive logs.

- A database backup is a copy of the entire database or tablespaces. This backup is accomplished by executing a DB2 `BACKUP DATABASE` command. A database backup can be initiated through NetBackup by an automatic backup of a DB2 class, a manual backup of a DB2 policy, or a user-directed backup.
- An archive log backup is a backup of an archive log file for DB2. These backups are initiated by DB2 through a user exit program.

Automatic Backup of a DB2 Policy

The most convenient way to back up your database is to set up schedules for automatic backups. When the NetBackup scheduler invokes a schedule for an automatic backup, the DB2 scripts run:

- In the same order as they appear in the file list
- On all clients listed in the client list

The DB2 scripts will start the database backup.

To add a new schedule or change an existing schedule for automatic backups, follow the guidelines given in the Configuration chapter.

Manual Backup of a DB2 Policy

The administrator on the master server can use the NetBackup administrator's interface to manually execute an Automatic Backup schedule for a DB2 policy. The instructions for doing this are the same as given in "Testing NetBackup for DB2 on UNIX Configuration Settings" on page 67.

Using DB2 to Perform a Backup

You can start a backup by executing the DB2 `BACKUP DATABASE` command from the command line on the client. For example:

For a Solaris client you would enter:

```
db2 backup database sample load /install_path/netbackup/bin/nbdb2.so
```

For an AIX client you would enter:

```
db2 backup database sample load /install_path/netbackup/bin/nbdb2.sl
```

Refer to the *IBM DB2 Universal Database Command Reference* for details on using the DB2 `BACKUP DATABASE` command.

Using `xbp` to Perform a Backup

Note `xbp` is not supported on AIX platforms.

The following describes how to use `xbp` to back up your database. Refer to the NetBackup User's Guide - UNIX for detailed instructions on using `xbp` to back up the database.

1. Log in as the DB2 administrator or as root.

   If you are already logged in under a different user account, use the `su -` command to change to the DB2 administrator.

2. Execute `xbp` on the client to which you want to backup a database.

   ***install_path*/netbackup/bin/xbp**

3. In the Directory to Search Box, type the path name of the location of the DB2 scripts. For example:

   ***install_path*/netbackup/ext/db_ext/*db2*/scripts/**

4. From the File menu, click **Browse File System for Backup Scripts**.

5. Select the backup script from the Files pane.

6. On the Backup menu, click **Backup Database Using Selected Scripts**. The xbp_confirm dialog box appears.

7. Click **OK**.

   A NetBackup process called `bphdb` starts the DB2 script on the client.

8. View the status of the script execution.

   a. On the Backup menu, click **Report Progress Of Backup...**. The xbp_progress dialog box will appear.

   b. Select the log file for your backup.

The Contents of Selected Log File pane displays only the status of the script execution. A status =0 message indicates that the script was successfully completed. Go to Step 9 for a detailed status report. For a status other than 0, refer to the Troubleshooting section of this manual. For additional information, check the output of the script.

9. View the log file for the NetBackup operation.

a. Change directories to the bphdb log directory.

```
cd install_path/netbackup/logs/bphdb
```

b. Open the log file with the tail option.

```
tail -f log.mmddyy
```

A `Backup completed SUCCESSFULLY` message indicates a successfully completed NetBackup operation.

Browsing Back Ups

You can also use the `DB2 LIST BACKUP/HISTORY` command. For instructions on using this command, see the *IBM DB2 Universal Database Command Reference* manual.

Using `bplist` to Browse

The following example uses `bplist` to search all DB2 backups (images) for the client named camel, which is also the master server. The information comes from the NetBackup catalog on the master server. The `-t 18` on this command specifies DB2 backup types. The `bplist` output shows the list of DB2 database backup images that are stored in the NetBackup database. See the NetBackup online help for more information on the `bplist` command.

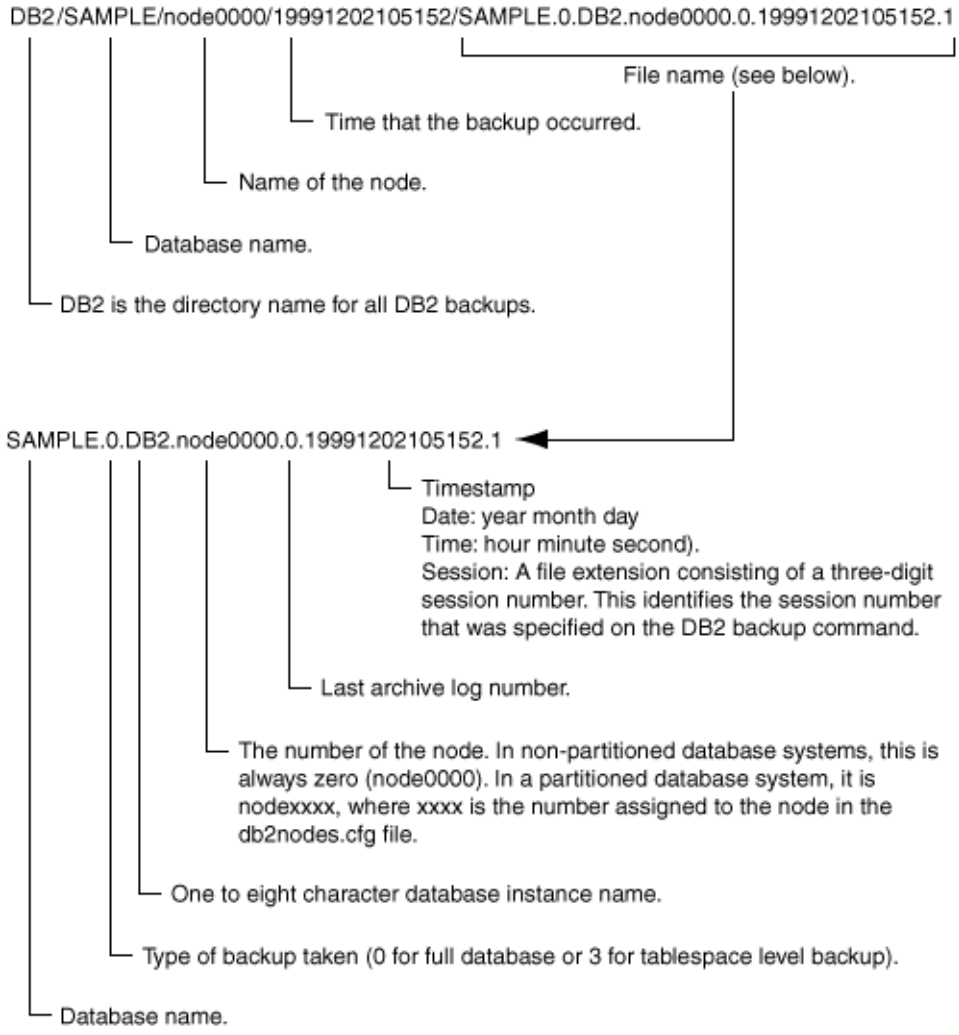
```
install_path/netbackup/bin/bplist -C camel -S camel -t 18 -R /
/DB2/SAMPLE/node0000/19991202105152/SAMPLE.0.DB2.node0000.0.19991202105152.1
/DB2/SAMPLE/node0000/19991202104734/SAMPLE.0.DB2.node0000.0.19991202104734.1
/DB2/SAMPLE/node0000/19991201171209/SAMPLE.0.DB2.node0000.0.19991201171209.1
/DB2/SAMPLE/node0000/19991129154117/SAMPLE.3.DB2.node0000.4.19991129154117.1
/DB2/SAMPLE/node0000/19991129142046/SAMPLE.0.DB2.node0000.0.19991129142046.1
```

The next example uses bplist to search for all DB2 archive log file backups. The -k DB2_Log_Policy specifies files backed up using this policy. The policy name originates from the settings in the db2.conf file for archive log files. The `bplist` output shows the list of DB2 archive log files stored in NetBackup.

```
install_path/NetBackup/bin/bplist -k DB2_Log_Policy -C camel -S camel -R /
```

```
/home/db2inst/NODE0000/SQL00001/SQLOGDIR/S0000026.LOG
/home/db2inst/NODE0000/SQL00001/SQLOGDIR/S0000025.LOG
/home/db2inst/NODE0000/SQL00001/SQLOGDIR/S0000024.LOG
```

The following diagram explains how to interpret one of the lines from the listing.


DB2/SAMPLE/node0000/19991202105152/SAMPLE.0.DB2.node0000.0.19991202105152.1
File name (see below).
Time that the backup occurred.
Name of the node.
Database name.
DB2 is the directory name for all DB2 backups.
SAMPLE.0.DB2.node0000.0.19991202105152.1
Timestamp
Date: year month day
Time: hour minute second).
Session: A file extension consisting of a three-digit session number. This identifies the session number that was specified on the DB2 backup command.
Last archive log number.
The number of the node. In non-partitioned database systems, this is always zero (node0000). In a partitioned database system, it is nodexxxx, where xxxx is the number assigned to the node in the db2nodes.cfg file.
One to eight character database instance name.
Type of backup taken (0 for full database or 3 for tablespace level backup).
Database name.

Using `xbp` to Browse

Note `xbp` is not supported on AIX platforms.

The following describes how to use `xbp` to browse your database backups. Refer to the *NetBackup User's Guide - UNIX* for detailed instructions on using `xbp` to browse database backups.

1. Log in as the DB2 administrator or as root.

   If a different user account is used, use the `su` command to change to the DB2 administrator.

2. Execute `xbp` on the client.

   ***install_path*/netbackup/bin/xbp**

   The xbp dialog box appears.

3. From the File menu, click Configuration....

   The xbp_config dialog box appears.

   a. In the Class type of image to browse, specify the DB2 policy.

   b. Click **OK** to close the dialog box.

   c. In the Directory To Search Box, enter / as the directory to search.

   d. Set the Range of Dates to include the date of your backup.

   e. Enter `9` in the Directory Depth Box.

   f. From the File menu, select Browse Backups (Restore). A list of backup images will appear in the dialog box.

Performing a Restore

The procedure for restoring a DB2 database depends on the database involved and the problems that you have on your system. See the *DB2 UDB Administration Guide Data Recovery and High Availability Guide* for a complete description of how to recover a DB2 database.

Automatic Restore of a DB2 Policy

The following procedure shows how to restore our example database, SAMPLE, to the level of a recent database backup plus archive logs.

1. Perform a user-directed restore using DB2. See "Using DB2 to Restore" on page 77.

2. Browse and restore archive log.

   See "Using bplist to Browse" in the previous section. Also follow the instructions in "Using ARCFUNC During Restore of Archive Log Files" on page 63.

3. Run the DB2 `ROLLFORWARD DATABASE` command. This brings the database back on-line. For example:

   ```
   db2 rollforward database sample to end of logs and stop
   ```

   For more information on this command, refer to the *IBM DB2 Universal Database Command Reference* manual.

Using DB2 to Restore

You can also start a restore by executing the DB2 `RESTORE DATABASE` command from the command line on the client. For example:

For a Solaris client you would enter:

```
db2 restore database sample load /install_path/netbackup/bin/nbdb2.so
```

For an AIX client you would enter:

```
db2 restore database sample load /install_path/netbackup/bin/nbdb2.sl
```

Refer to the *IBM DB2 Universal Database Command Reference* manual for details on using the DB2 `RESTORE DATABASE` command.

Using xbp to Perform a Restore

The following describes how to use xbp to restore your database. Refer to the *NetBackup User's Guide - UNIX* for detailed instructions on using xbp to restore database backups.

1. Log in as the DB2 administrator or as root.

   If a different user account is used, change the su- command to the DB2 administrator.

2. Execute xbp on the client to which you want to restore a database.

   ***install_path*/netbackup/bin/xbp**

3. In the Directory to Search Box, type in the path name of the location of the DB2 scripts. For example:

   ***install_path*/netbackup/ext/db_ext/*db2*/scripts/**

4. From the File menu, click Browse File System for Restore Scripts. The xbp dialog box appears.

5. Select the restore script from the Files pane.

6. On the Restore menu, click Restore Database Using Selected Scripts. The xbp_confirm dialog box appears.

7. Click **OK**.

   A NetBackup process called bphdb starts the DB2 script on the client.

8. View the status of the script execution.

   a. On the Restore menu, click Report Progress Of Restore.... The xbp_progress dialog box will appear.

   b. Select the log file for your restore.

      The Contents of Selected Log File pane displays only the status of the script execution. A status =0 message indicates that the script was successfully completed. Go to Step 9 for a detailed status report. For a status other than 0, refer to the Troubleshooting section of this manual.

9. View the log file for the NetBackup operation.

   a. Change directories to the bphdb log directory.

      cd /usr/openv/netbackup/logs/bphdb

b. Open the log file with the tail option.

```
tail -f log.mmddyy
```

A `Restore completed SUCCESSFULLY` message indicates a successfully completed NetBackup operation.

Using NetBackup for DB2 with SAP® 5

When a DB2 database is used by SAP software, NetBackup for DB2 can be used within that environment for backup and restore of SAP data. This chapter provides guidelines for using SAP, DB2, and NetBackup together.

This chapter contains the following sections:

- Installation of the DB2 User-Exit Program
- Backup and Restore of DB2 Databases
- Archive and Restore of DB2 Log Files
- Backup of SAP Files

Installation of the DB2 User-Exit Program

DB2 allows for the presence of a single user-exit program to manage archiving of database log files. Both SAP and NetBackup deliver user-exit programs for exclusive use by DB2. The user-exit program resides in the DB2 database directory as db2uext2.

Note The use of the NetBackup user-exit program is required, because it provides for automatic archiving of log files to tape and on-demand recovery of log files by DB2.

Take precautions when installing SAP to prevent overwriting the NetBackup user-exit program. Always preserve the NetBackup db2uext2 file before installing SAP, and restore afterwards.

Backup and Restore of DB2 Databases

Follow the standard NetBackup instructions in this document for backup and restore of the DB2 database(s) used by SAP. You may use either DB2 or NetBackup to initiate database backups and restores.

Caution *Do not* use SAP CCMS, sapdba, brbackup, or brrestore commands to initiate backups or restores. They will not invoke NetBackup.

Caution Also, SAP must not be running when attempting to restore the database.

Archive and Restore of DB2 Log Files

Follow the standard NetBackup instructions in this document for configuring the user-exit program. DB2 will automatically invoke the user-exit program to archive and recover the necessary log files.

Caution DO NOT use SAP CCMS, sapdba, brarchive commands, or the SAP Logfile Management window in the DB2 Control Center for log file archival. They are dependent upon the SAP user-exit program for proper operation.

Backup of SAP Files

Be certain to include any / all SAP files when planning for SAP recovery, not just the DB2 database. For instance, any regular files used by SAP can be backed up using standard NetBackup file backup procedures. For file backup instructions, consult the “Performing Backups” section in the NetBackup User's Manual.

Troubleshooting 6

NetBackup, NetBackup for DB2 on UNIX, and the DB2 commands all provide reports on database operations. These reports are useful for finding errors associated with those applications.

NetBackup Reports

The NetBackup server and client software allow you to set up detailed debug logs for troubleshooting problems that occur outside of either NetBackup for DB2 on UNIX or the DB2 commands. See the *NetBackup Troubleshooting Guide - UNIX* or the *NetBackup Troubleshooting Guide - Windows NT Server* for a complete description of debug logs. Also see the *install_path*`/netbackup/logs/README.debug` file.

Note These logs do not reveal errors that occur during the execution of the DB2 commands, unless those errors also affect NetBackup for DB2. DB2 may (or may not) use the NetBackup for DB2 logs for errors in the application. Your best sources for DB2 error information are the logs provided by DB2.

Enable the NetBackup for DB2 on UNIX logs by performing the following steps.

1. Create the following directories on the client:

   install_path`/netbackup/logs/bphdb`
   install_path`/netbackup/logs/bpdb2`

   ```
   % cd install_path/netbackup/logs
   % mkdir bpdb2
   ```

2. Set the access permissions to 777 on these log directories.

   ```
   % chmod 777 bphdb
   % chmod 777 bpdb2
   ```

The following sections describe the logs created when you create the log directories. Use a text editor to view the contents of the logs.

`bphdb` Directory on the Client

The *install_path*`/netbackup/logs/bphdb` directory contains the following types of logs. These logs are a good starting place to determine what type of error occurred.

`db2_stdout.`*mmddyy*

Unless redirected elsewhere, NetBackup places DB2 script output in this file.

`db2_stderr.`*mmddyy*

Unless redirected elsewhere, NetBackup places DB2 script errors in this file.

`log.`*mmddyy*

`bphdb` is the NetBackup Database Backup binary. This log contains debugging information for the `bphdb` process. NetBackup for DB2 on UNIX uses this client process for DB2 script execution. It is invoked when an automatic backup schedule is executed.

`bpdb2` Directory on the Client

The *install_path*`/netbackup/logs/bpdb2` directory contains the following execution log.

`log.`*mmddyy*

This log contains debugging information and execution status for the DB2 NetBackup client processes linked to the library program provided with NetBackup for DB2 on UNIX.

NetBackup Server Reports

NetBackup provides other reports that are useful in isolating problems. One such report is All Logs Entries on the server. See the *NetBackup System Administrator's Guide* for a description of this and other reports.

Setting the Debug Level

You can control the amount of information written to the debug log in the *install_path*/netbackup/logs/bpdb2 directory by changing the Database debug level. The higher the value, the more information is logged. In everyday normal operations, the default value of 0 is sufficient. However, VERITAS technical support may ask you to set the value higher when a problem is being analyzed. 5 is the highest possible setting.

- To change the Debug Level, enter the following line in the bp.conf file.

```
VERBOSE = 5
```

Preventing Timeout Failures on Large Database Restores

Large database restores sometimes fail when multiple restore sessions compete for resources. In this situation, a restore session can be delayed waiting for media or device access. If the delay is too long, the restore session will timeout.

This problem can be resolved by increasing the NetBackup Client Read Timeout setting, which will prevent session timeouts and allow the restores to complete successfully.

Use the NetBackup Administration Console on the server to change the properties of each client that contains a database you may need to restore. The default for the Client Read Timeout setting is 300 seconds (5 minutes). For database agent clients, increase the value significantly to prevent timeout errors, e.g. 30 minutes.

Using NET_BUFFER_SZ to Speed Up a Slow Restore

When the restore is slow you can speed it up by creating a file in the NetBackup install , /NET_BUFFER_SZ, on the NetBackup master server. In the file, add the size of the socket you want to set in number of bytes. For example, 32768 bytes = 32K.

Note This only applies when the NetBackup master server is a UNIX machine.

Reason Code

The following reason code can occur while accessing the NetBackup shared library during the processing of a DB2 database utility BACKUP or RESTORE. Refer to the log files for more detail information about an error message.

300

Message:

```
ERR - No match for a database image file was found based on
the following criteria.
```

Cause:

The restore criteria of database name, instance, type, and backup time object can not be found in the NetBackup database.

Action:

Make sure the image you are trying to restore exist by using `bplist` to list it.

Make sure the correct instance is being used.

Make sure the correct values are set in `db2.conf` and `bp.conf`.

If logging is turned on, check the current log file in *install_path*`/netbackup/logs/bpdb2` directory for more information.

305

Message:

```
ERR - found more than one object.
```

Cause:

More than one DB2 backup images were found in the NetBackup database that matched the restore criteria of database name, instance, type and backup time.

Action:

This should not happen under normal operation.

If logging is turned on, check the current log file in *install_path*`/netbackup/logs/bpdb2` directory for more information.

310

Message:

```
ERR - bp.config failed with <%d> status.
```

Cause:

Unable to read configuration file *install_path*`/NetBackup/bp.conf`.

Action:

Make sure this file exists and is properly configured.

If logging is turned on, check the current log file in *install_path*/netbackup/logs/bpdb2 directory for more information.

330

Message:

```
ERR - Invalid options encountered for action %s.
```

Cause:

Invalid option(s) encountered for the action. The %s is for a string that will be inserted according to the error condition.

Action:

Make sure the action parameters are used properly.

335

Message:

```
ERR - in get DB2 UDB level.
```

Cause:

NetBackup server and NetBackup DB2 shared library are not the same level.

Action:

Make sure NetBackup and DB2 shared library are the same level. Check the log file in *install_path*/netbackup/logs/bpdb2 directory for the version number of the shared library and the version number for NetBackup. If they are not the same, you will need to install the same level.

380

Message:

```
ERR - db2.conf read status error <%d>.
```

Cause:

db2.conf read status error.

Action:

Make sure the directory is accessible with read and write permissions. Also make sure the file exists and has read permission.

385

Message:

```
ERR - Found multiple <DATABASE> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple DATABASE entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra DATABASE entry.

390

Message:

```
ERR - Found multiple <OBJECTTYPE> entries before an
<ENDOPER> entries was encountered.
```

Cause:

Found multiple OBJECTTYPE entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra OBJECTTYPE entry.

395

Message:

```
ERR - Found multiple <CLASS> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple CLASS entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra CLASS entry.

400

Message:

```
ERR - Found multiple <SCHEDULE> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple SCHEDULE entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra SCHEDULE entry.

405

Message:

```
ERR - Found multiple <ARCFUNC>entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple ARCFUNC entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra ARCFUNC entry.

410

Message:

```
ERR - Found multiple <ARCDIR> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple ARCDIR entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra ARCDIR entry.

415

Message:

```
ERR - Found multiple <RETDIR> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple RETDIR entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra RETDIR entry.

420

Message:

```
ERR - need to specify a valid CLASS or SCHEDULE in db2.conf
for <DATABASE %s> and <OBJECTTYPE %s>.
```

Cause:

Class name or schedule name is not specified in the CLASS SHEDULE entry in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add an appropriate class name or schedule name to the CLASS or SCHEDULE entry.

425

Message:

```
ERR - need to specified a valid ARCDIR in db2.conf: Errno =
%d : %s.
```

Cause:

Invalid ARCDIR is specified in db2.conf.

Action:

Add an appropriate directory name to the ARCDIR entry.

430

Message:

```
ERR - ARCDIR field needs to be specified in the db2.conf
file.
```

Cause:

No ARCDIR entry found in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add ARCDIR field to the *$DB2_Instance_Home*/db2.conf file with an appropriate directory name as a parameter.

435

Message:

```
ERR - RETDIR field needs to contain a valid file when
OBJECTTYPE is equal to ARCHIVE: %s.
```

Cause:

RETDIR field does not contain a valid file.

Action:

RETDIR field needs to contain a valid file when OBJECTTYPE is equal to ARCHIVE in the *$DB2_Instance_Home*/db2.conf file.

440

Message:

```
ERR - COPY or SAVE needs to be specified for ARCFUNC when
OBJECTTYPE is equal to ARCHIVE.
```

Cause:

Found OBJECTTYPE equal to ARCHIVE but no ARCFUNC is found in the db2.conf file.

Action:

Need to specify a copy or save parameter for ARCFUNC when OBJECTYPE is equal to ARCHIVE.

445

Message:

```
ERR - Invalid <OBJECTTYPE> entries: <%s>.
```

Cause:

Invalid OBJECTTYPE entry in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add the appropriate object type to the *$DB2_Instance_Home*/db2.conf file.

450

Message:

```
ERR - OBJECTTYPE entry needs to be specified.
```

Cause:

OBJECTTYPE entry is not specified in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add the appropriate object type to the *$DB2_Instance_Home*/db2.conf file.

455

Message:

```
ERR - CLASS entry needs to be specified.
```

Cause:

CLASS entry is not specified in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add the appropriate class name to the CLASS entry in the *$DB2_Instance_Home*/db2.conf file.

502

Message:

NetBackup DB2 Handle Invalid

Cause:

Internal communication between DB2 and NetBackup has failed.

505

Message:

The input parameters supplied by DB2 are not valid.

Cause:

This may result from using an unsupported version of DB2

507

Message:

NetBackup Initialize Failed

Cause:

NetBackup encountered errors in preparing for the requested operation. This may result from improper configuration.

510

Message:

NetBackup Read Config Failed

Cause:

NetBackup encountered errors in reading configuration settings.

Action:

Check that the NetBackup client & server settings have been configured, and that the db2.conf file exists and has been configured.

511

Message:

NetBackup Write Config Failed

Cause:

NetBackup encountered errors in preparing for the requested operation. This may result from improper configuration.

513

Message:

NetBackup Begin Action Failed

Cause:

NetBackup encountered errors when attempting to start the requested operation. This may indicate a problem in obtaining necessary resources.

514

Message:

NetBackup Create Image Failed

Cause:

NetBackup encountered errors when attempting to create a backup image.

515

Message:

NetBackup Get Image Failed

Cause:

NetBackup encountered errors when attempting to access a backup image.

516

Message:

NetBackup Find Image Failed

Cause:

NetBackup encountered errors when attempting to locate a backup image.

518

Message:

NetBackup Write Failed

Cause:

NetBackup encountered errors when writing a backup image.

520

Message:

NetBackup Read Failed

Cause:

NetBackup encountered errors when reading a backup image

523

Message:

NetBackup Commit Data Failed

Cause:

NetBackup encountered errors when attempting to close the backup image.

524

Message:

NetBackup Commit Action Failed

Cause:

NetBackup encountered errors when attempting to complete the requested operation.

526

Message:

NetBackup Abort Action Failed

Cause:

NetBackup encountered errors when attempting to abort the previously requested operation.

528

Message:

NetBackup Delete Image Failed

Cause:

NetBackup encountered errors when attempting to expire an incomplete backup image. This typically indicates the previous operation has failed, and DB2 is attempting to delete any incomplete image.

Configuration for an DB2 EEE Environment A

The following is the configuration procedure.

1. Configure the Media Manager.

   The instructions for configuring the Media Manager for DB2 EEE are the same as those for DB2. Refer to “Configuring the Media Manager” on page 27.

2. Set the Maximum Jobs per Client Global attribute.

   The instructions for setting the Maximum Jobs per Client global attribute for DB2 EEE are the same as those for DB2. Refer to “Setting the Maximum Jobs per Client Global Attribute” on page 27.

3. Add NetBackup policies for the DB2 EEE environment.

   The instructions for adding policies to NetBackup are different for DB2 EEE. Refer to “Adding NetBackup Policies for DB2 EEE Environment” on page 100.

4. Create DB2 Scripts for the DB2 EEE environment.

   The instructions for creating scripts for DB2 EEE are the same as those for DB2. Refer to “Creating Scripts for DB2 Environment” on page 57.

   Also refer to “Creating DB2 Scripts for DB2 EEE Environment” on page 104 to view a DB2 EEE script.

5. Create a *$DB2_Instance_Home*`/db2.conf` file.

   The instructions for configuring the `db2.conf` files for DB2 are the same as those for DB2. Refer to “Creating a db2.conf File” on page 61.

6. Test NetBackup for DB2 configuration settings.

   The instructions for testing DB2 configuration settings are the same as those for DB2. Refer to “Testing NetBackup for DB2 on UNIX Configuration Settings” on page 67.

Adding NetBackup Policies for DB2 EEE Environment

A DB2 EEE environment requires two separate DB2 policies: one for an Application Backup schedule type of backup and another for an Automatic Backup schedule type of backup.

To back up archive logs it will be necessary to add a separate Standard-type policy.

The following policies must be configured for a DB2 EEE environment.

- A DB2 type policy that has an Automatic Backup backup type schedule.

  This policy should contain only one Automatic Backup backup schedule type. It includes only the clients that:

  - contain the system catalog
  - run a DB2 script.

  The script uses the IBM `db2_all` command to archive the catalog nodes before any other node is backed up. For configuration instructions, see the next topic "To Create a DB2 policy with Automatic Backup schedule type" on page 100.

- A DB2 type policy with an Application Backup schedule type.

  This policy should contain only one Application backup schedule type . This policy includes *all* clients to be backed up in the client list, including the catalog node. For configuration instructions, see the "To create a DB2 policy with Application Backup schedule type" on page 101."

- Standard type policy with a User Backup type schedule.

  For configuration instruction, see "To Create a Standard Policy" on page 102.

▼ To Create a DB2 policy with Automatic Backup schedule type

Note Do not specify this policy or schedule name in the *$DB2_Instance_Home*`/db2.conf` file.

1. Add a new policy, as specified in "Configuring a NetBackup Policy" on page 29.
2. Specify the general attributes for the policy:
   a. Select DB2 for the policy type.
   b. Specify other attributes as desired.
3. Delete the schedule called Default-Application-Backup.
4. Configure a schedule for an Automatic Backup type of backup.

When the NetBackup scheduler invokes an *Automatic Backup* type of backup, NetBackup for DB2 on UNIX will execute the DB2 EEE scripts listed in the File list, on each client listed in the Client list.

Since all the DB2 EEE scripts execute during automatic backups, you may need a separate DB2 policy for each type of backup you want to execute automatically on the same database. For example, to perform both full and tablespace backups of the same database, two different DB2 EEE scripts are required. If you put both DB2 EEE scripts in the same DB2 policy, NetBackup for DB2 on UNIX executes both of them during each Automatic Backup session for that DB2 policy. This means that you will be performing both full and tablespace backups during the same backup type, which is normally undesirable.

5. Configure the Files list.

Note Specify a Files list if unattended scheduled backups are going to be performed.

List the DB2 EEE scripts that you want to execute on the client. Always specify the full path name for a DB2 EEE script file list. For example:

/ netbackup / ext / db_ext / db2 / scripts / db2_offline_backup.sh

Note The scripts provided are not intended for production. Modify these scripts to suit your needs.

See “Creating DB2 Scripts for DB2 EEE Environment” on page 104 for information on creating a DB2 EEE script.

Caution NetBackup does not interpret a DB2 EEE script. Be sure to use the correct DB2 EEE script name in the file list to prevent an error or possibly a wrong operation.

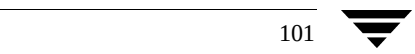
6. Specify all DB2 clients that will run the DB2 script. These must be the clients that contain the system catalog. Click OK.

7. Click OK.

The Add New Policy dialog box closes. The policy you just configured appear in the policy list.

▼ To create a DB2 policy with Application Backup schedule type

Note The name of the policy must be specified in the *$DB2_Instance_Home*/`db2.conf` file on the client.



1. Add a new policy, as specified in “Configuring a NetBackup Policy” on page 29.
2. Specify the general attributes for the policy:
   a. Select DB2 for the policy type.
   b. Specify other attributes as desired.
3. Double-click the schedule called Default-Application-Backup. Configure the schedule properties for an Application Backup schedule type.
4. Specify the clients that you want to back up. The client must:
   - Have DB2 UDB installed
   - Have NetBackup for DB2 on UNIX installed
5. Click OK.

   The Add New Policy dialog box closes. The policy you just configured appear in the policy list.

▼ To Create a Standard Policy

A Standard type policy must be added when:

- `userexit` for logging is turned on in DB2 UDB.
- Client is a UNIX machine.

Note The name of the policy must be specified in the *$DB2_Instance_Home*`/db2.conf` file on the client.

1. Add a new policy, as specified in “Configuring a NetBackup Policy” on page 29.
2. Specify the general attributes for the policy:
   a. Select Standard for the policy type.
   b. Specify other attributes as desired.
3. Add a schedule:
   a. Type the name of your schedule.
   b. In the **Type of Backup** box, select **User Backup**.

This is a user backup that is started by the NetBackup for DB2 on UNIX user-exit program on the client. This schedule specifies the criteria for DB2 archive logs file backups. A User Backup schedule enables user controlled NetBackup operations performed on the client.

c. In the **Retention** box, set the time period needed to retain two full backups of your database.

For example, if your database is backed up once every Sunday morning, select a retention period of at least two weeks.

d. In the **Start Window** section of the **Schedules** dialog, set the time of day when you want backups to occur.

This schedule must encompass *all of the time periods* during which DB2 UDB can call the user-exit program.

Note You do not configure a file list for this policy because it will be a User Backup type schedule.

---

4. Specify the clients that you will be backing up. The client must have:

- DB2 UDB installed
- NetBackup for DB2 on UNIX installed

5. Click **OK**.

The Add New Policy dialog box closes. The policy you just configured appears in the policy list.

Creating DB2 Scripts for DB2 EEE Environment

1. Copy the example scripts to a different directory on your client. DB2 EEE scripts can be located anywhere on the client.

2. Modify the script

   a. Use a text editor to open the script.

   b. Follow the instructions in the script.

Note Test the scripts you just created by backing up the policy as explained in "Testing NetBackup for DB2 on UNIX Configuration Settings" on page 67.

Example

The following shows a sample script:

install_path/dbext/db2/samples/db2_mpp_backup_offline.sh:

```
#!/bin/sh


# Purpose: This is an sample script that is used the "db2_all" command to
#          performs a backup in a MPP environment.  It needs to be modified
#          before it will work in your environment.  The following are same
#          of the line that need to be modified:
#              - USER="db2inst1"
#              - DB2_CMD="db2 BACKUP DATABASE sample .........
#              - DB2_ALL='db2_all "||\'<<+0< '
#          In order for this sample script two seperate policy needs to be
#          define.  The first policy should contain the following:
#             -  Clients: one client name that defines the catalog node
#             -  Schedules: define one "Automatic Backup" schedule
#             -  Files: the path name to a modified version of this sample
#                       scripted.
#          The second policy should contain the following:
#             -  Clients: all the client name in the node list
#             -  Schedules: define one "Backup Policy" schedule
#             -  Files: none
#
# Logic Flow:  1. Backup the catalog node
#                 a. su to db2 user account
#                 b. set node through export
#                 c. call db2 backup command
#              2. Wait until catalog node backup completes successfully
#              3. Start backup of all other nodes in parallel.
#                 a. su to db2 user account
#                 b. call db2_all to backup all nodes except catalog node.
```

```
#                c. tell db2_all to exit after all backup commans are started.
#
# Environment Var:  The following is a list of environment variable that are
#                   set by bphdb (scheduler) or xbp.  These variable can be
#                   used to coniditionalize this script.  The variable are
#                   local to this script and are not pass on to "db2 backup"
#                   or "db2 restore".
#
#                      DB2_POLICY - policy name
#                      DB2_SCHED - schedule name
#                      DB2_SERVER - server name
#                      DB2_USER_INITIATED = boolean, true if initiated by xbp
#                      DB2_SCHEDULED - boolean, true if initiated by scheduler


# ----------------------------------------------------------------------------
# NOTE:  Set the USER variable to a valid db2 user name.  Since this script
#        is executed for root, we need to set the USER variable to a valid
#        user name that can perform DB2 backup/restore commands.  This
#        variable is used on the "su" command.
# ----------------------------------------------------------------------------
USER="db2inst1"

NB_DIR="/usr/openv/netbackup"
LOG_DIR=$NB_DIR"/logs/bphdb"

# ----------------------------------------------------------------------------
# NOTE: Define DB2_CMD to the call "db2 backup" correctly.  The correct
#       database name and other needed parameter should be define in the
#       DB2_CMD variable.
# ----------------------------------------------------------------------------
SYSTEM=`uname`
case ${SYSTEM} in
        "AIX") DB2_CMD="db2 BACKUP DATABASE sample LOAD "$NB_DIR"/bin/nbdb2.sl";;
        "SunOS") DB2_CMD="db2 BACKUP DATABASE sample LOAD "$NB_DIR"/bin/nbdb2.so";;
esac


# ----------------------------------------------------------------------------
# NOTE: Define DB2_ALL to call the "db2_all" command with the correct options.
#       It is currently defined to run the remote backup commands on all the
#       node except node 0 as parallel daemon i.e. in the background with stdin
#       stdout and stderr all close.  This option use the fews amount of
#       resource, but make debugging more difficult if error occur in
#       initialization process.  To help with debugging stdout is redirected
#       to the bphdb log directory.
# ----------------------------------------------------------------------------
DB2_ALL='db2_all "||\`<<-0< '

EXP_NODE="export DB2NODE=0;"
EXP_DIR="export RAHBUFDIR="$LOG_DIR";"
EXP_NAM="export RAHBUFNAME=db2_rahout;"
TIME=`date +"%m%d%y"`
RETURN_STATUS=0
```

```
#
# Start the catalog node backup.
#

CMD_LINE=$EXP_NODE$DB2_CMD
#echo "Execute $CMD_LINE"
#su - $USER -c "$CMD_LINE"
#RETURN_STATUS=$?

#
# if the catalog node backup is succussfully start all other backups in
# in parallel by using db2_all
#

if [ $RETURN_STATUS -eq 0 ]
then

  CMD_LINE=$EXP_DIR$EXP_NAM$DB2_ALL$DB2_CMD' >> '$LOG_DIR'/db2_stdout.'$TIME'"'
  echo "Execute $CMD_LINE"
  su - $USER -c "$CMD_LINE"

  RETURN_STATUS=$?

fi

exit $RETURN_STATUS
```

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